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Occupational stress in a South African workforce: instrument testing, prevalence measurement and risk factor analysis

Volmink, Heinrich Cyril

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Occupational Stress in a South African Workforce: Instrument Testing, Prevalence Measurement and Risk Factor Analysis

Heinrich Cyril Volmink

A research report submitted to the Faculty of Health Sciences of the University of the Witwatersrand in partial fulfillment of the requirements for the degree of Master of Medicine in the branch of Community Health (Public Health Medicine).

Supervisors:

Professor David Rees

Dr Spo Kgalamono

May 2014

DECLARATION

I, Heinrich Cyril Volmink, declare that this research report is my own. It is being submitted as per the requirements for the degree of Master of Medicine in the branch of Community Health (Public Health Medicine). It has not been used, either wholly or partially, for any other degree or examination at this or any other university.



27 May 2014

HC Volmink

Date

DEDICATION

This dissertation is dedicated to my wife, Odette, and my son, Caleb. You have given me strength and inspiration during this difficult process. Thank you, both, for saving me from a high level of occupational stress.

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I would like to thank my supervisors, Professor David Rees and Dr Spo Kgalamono (from the National Institute for Occupational Health and the University of the Witwatersrand) for their incredible guidance, insight and support. Mr Cornelius Nattey and Dr Eustasius Musenge also gave me considerable technical advice for which I am appreciative. I would like to acknowledge the management of Chris Hani Baragwanath Academic Hospital, especially Dr Nkele Lesia and Mr Allen Mbalati, as well as the staff members who helped us on-site, especially Ms Zanele Mashigo. The following individuals provided fieldwork assistance, for which I am most grateful: Mr Joel Munyewende, Mr Kaddy Kalima, Mr Noko Thantsha and Sr Goitsimang Buffel. Finally, I would like to thank all of my colleagues in the Department of Community Health for their continual support.

ABSTRACT

Background

Occupational stress represents a substantial public health challenge. Although there has been an extensive focus on this form of stress within the international setting, there appears to be a paucity of relevant evidence within South Africa. Specifically, within the local context, there are relatively few: (1) reliability testing studies of screening and assessment instruments, (2) prevalence analyses of occupational stress and (3) work-related stress management intervention designs.

Methods

A cross-sectional descriptive and analytical study was undertaken in a large tertiary hospital in Johannesburg. Primary data were collected between February 2013 and September 2013 using the Copenhagen Psychosocial Questionnaire (COPSOQ). A sample (n=166) of administrative staff was selected, stratified into front line staff (n=54), back office staff (n=90) and managers (n=22).

Data analysis included reliability testing of the COPSOQ using the Cronbach's alpha statistic. Prevalence measurement was also undertaken to describe the distribution of stress and other variables across the study sample. Finally, logistic regression was used to estimate associations between the exposure variables and the *stress* outcome (at the $p < 0.05$ level of significance).

Results

The Cronbach's alpha range for the COPSOQ was 0.31 to 0.85. Two out of 24 scales of the instrument fell below the unacceptability threshold of 0.5. In terms of prevalence, the *stress* mean for the study sample (on a scale from 0 to 100) was 38.8 (SD 19.8). Furthermore, 68.1% (n=113) of the study sample had a *stress* value above the reference mean. There were also significant differences in the *stress* values by *job category,* with managers having the highest mean at 51.2 (SD 24.2).

Adjusting for *job category,* risk factors significantly associated with occupational stress in the main logistic model were *offensive behaviour* (OR 3.38, 95% CI: 1.54 – 7.43), *quantitative demands* (OR 2.83, 95% CI: 1.35 – 5.92) and *emotional demands* (OR 2.32, 95% CI: 1.08 – 4.96), while *quality of leadership* (OR 0.32, 95% CI: 0.15 – 0.67) was a protective factor. Further analysis showed that the most harmful risk factor for females was *work-family conflict* (OR 4.03; 95% CI: 1.45 - 11.21), and for males was exposure to *offensive behaviour* (OR 4.63; 95% CI: 1.15 - 18.63). Finally, ordinal regression found *offensive behaviour* (OR 3.60; 95% CI: 1.92 - 6.75) and *quantitative demands* (OR: 2.38; 95% CI: 1.27 - 4.46) to be significant risks for moving from *low stress* to *high stress*, while a *commitment to workplace* (OR 0.46; 95% CI: 0.24 - 0.86) could help to prevent this.

Conclusions

The level of occupational stress in the study sample was high relative to reference values. An occupational stress intervention is recommended, which should include

primary, secondary and tertiary prevention strategies (according to identified risks). Further development of the instrument is also recommended, so as to improve its reliability in the local context. Finally, future research into occupational stress should explore the impact of factors such as resource constraints and HIV/AIDS, and should include an expansion into other settings and occupational categories.

Key words

Occupational stress, questionnaire reliability, psychosocial risks, intervention design.

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ABBREVIATIONS

CI	Confidence interval
COPSOQ	Copenhagen Psychosocial Questionnaire
EI	Emotional intelligence
EU	European Union
ILO	International Labor Organization
MID	Minimal important difference
NIOH	National Institute for Occupational Health
NIOSH	National Institute of Occupational Safety and Health
NHS	National Health Service
PRIMA-EF	European Framework for Psychosocial Risk Management
OR	Odds ratio
PTSD	Post-traumatic stress disorder
USD	United States dollar
VIF	Variance inflation factor
WHO	World Health Organization
ZAR	South African rand

GLOSSARY

Commitment to workplace:	Concerns the extent to which employees would tell other people about their work and/or encourage other people to join their workplace. Includes an indication of possible intentions to leave the workplace.*
Emotional demands:	Demands arising from emotional involvement with, or disturbing aspects of, work tasks or work environment (includes engaging with the personal problems of other people).*
Influence:	Degree to which employees can influence the assignment of their work, as well as choose who they work with.*
Instrument:	Any tool (such as a questionnaire) used for detecting and measuring occupational stress.
Job satisfaction:	Level of satisfaction that employees have with regards to their work, including perceptions of job prospects and satisfaction with the actual physical conditions at work.*

Justice and respect:	Relates to perceptions around fairness of conflict resolution, distribution and appreciation of work, and treatment of suggestions.*
Meaning of work:	Degree to which work is meaningful and important to employees. Includes their perceived level of motivation.*
Mutual trust between employees:	General level of trust between co-workers. Also relates to the degree to which employees withhold information from each other and management.*
Offensive behaviour:	Pertains to sexual harassment, threats of violence, physical violence or bullying in workplace.*
Possibilities for development:	Extent to which there are opportunities for the use and/or development of skill. Possible requirements to take initiative with regards to work tasks are also relevant here.*
Predictability:	Degree to which employees receive information pertaining to changes and plans that concern them. Includes the provision of information related to task completion.*

Quality of leadership:	Perceptions that the employees have with regards to their supervisors' ability to plan work and resolve conflicts. Also involves perceptions of supervisors' concerns for employee development and level of job satisfaction.*
Quantitative demands:	Demands arising from workload distribution and volume as well as time-constraints.*
Rewards (recognition):	Relates to receiving respect and recognition from management for work accomplishments as well as perceived fair treatment in the working setting.*
Role clarity:	Clearness of work objectives, responsibilities and expectations.*
Role conflicts:	Conflicts arising from contradictions in demands or disagreements in relation to work tasks.*
Social community at work:	Pertains to the atmosphere between co-workers as well as the level of co-operation. Involves a sense of being part of the work community.*

Social support from colleagues:	Degree to which the employees find their *colleagues* to be helpful and supportive, prepared to listen to their work problems and opened to giving feedback with regards to the carrying out of work tasks.*
Social support from supervisors:	Degree to which the employees find their *supervisors* to be helpful and supportive, prepared to listen to their work problems and opened to giving feedback with regards to the carrying out of work tasks.*
Trust regarding management:	Extent to which the employees are able to express their feelings and viewpoints with management. Also includes the degree to which employees trust information given by management and suspicions around the withholding of this information. Management's trust in employees to do their work at a suitable level is also considered here.*
Work pace:	Rate and duration of pace for completing work tasks.*
Work-family conflict:	Conflict arising from work taking time and energy away from the employees private lives. Also relates to complaints from family members or friends about excessive work.*

** Source: Copenhagen Psychosocial Questionnaire scales guidance document (appendix 2).*

CHAPTER ONE

1. Introduction

1.1 Background

Enhancing mental health is a vital component of public health action. As Dr Margaret Chan, Director-General of the World Health Organization (WHO), has stated,

> "Mental well-being is a fundamental component of WHO's definition of health. Good mental health enables people to realize their potential, cope with the normal stresses of life, work productively, and contribute to their communities." [1(p.5)]

The above notwithstanding, mental illnesses impose a substantial burden of disease. The initial estimates of the 2001 *World Health Report* were that approximately 450 million people had a neuropsychiatric disorder. Furthermore, these illnesses accounted for 12.3% of the global disability adjusted life-years in 2000.[2] Within the national context, the *South African Stress and Health* study revealed a lifetime prevalence of 30.3% for any mental disorder, with the most prevalent class being anxiety disorders (15.8% lifetime prevalence).[3]

Occupational stress is a growing component of the mental health burden. Indeed, work-related stress has been described by the International Labor Organization (ILO) as a "global epidemic."[4] A 2009 study by the American Psychological Association, for example, showed that almost 70% of employees reported their work as being a

significant contributor to stress.[5] Furthermore, a 2005 European Union (EU) study showed that stress was experienced by over one-fifth of workers surveyed.[6] Although national prevalence data for work-related stress is not currently available in South Africa, stress have been described in a number of occupational categories in the country, including healthcare workers,[7] educators,[8] construction professionals,[9] police officers[10] and correctional service personnel.[11]

Numerous factors can act as risks for work-related stress. Characteristics that are intrinsic to the job (such as high workload), difficulties related to the employees organisational role (such as role ambiguity), lack of opportunities for career development and problematic relationships within the work environment[12,13] are among the important exposures. Furthermore, conflict between work and home life has also been shown to be a considerable stressor.[12]

Occupational stress has, in turn, been associated with a range of health outcomes. These include cardiovascular diseases such as hypertension,[14] coronary heart disease[15] and type 2 diabetes mellitus.[16] Stress experienced in the workplace may also lead to further psychopathology, such as burnout,[17] anxiety disorders,[18] depression[19] and suicide ideation.[20]

In addition to its health consequences, stress may impact adversely on workplace behaviour. Occupational stress has, for example, been shown to diminish job performance as well as impede cognition (including reduced concentration and perseverance).[21] A statistically significant relationship has also been shown between high levels of stress and illness-related absenteeism.[22]

There is certainly a substantial economic cost related to work-related stress, which may result from outcomes such as absenteeism as well as the required health care provision. It was estimated, for example, that occupational stress cost the EU 20 billion Euros in 2002.[23] In the United States, the cost of stress (in United States dollars, or USD) increased from USD 42 billion in 2002 to USD 300 billion for companies in 2006.[24] Within the South African context, it has been reported that occupational stress may carry with it an economic burden (in South African rands, or ZAR) of ZAR 3 billion per year.[25]

Given both the health and economic costs of occupational stress, the development of occupational stress interventions would appear to be an imperative. Interventions that have been shown to be particularly effective are those that (1) focus on the primary level of prevention (that is, the reduction of possible psychosocial risk factors) and (2) combine both an individual and an organisational focus.[26] Concomitant with the development of occupational stress management programmes would be the accurate measurement of the level of stress within workplaces. To this end, numerous validated and reliable occupational stress assessment tools, or instruments, have been developed.[27]

1.2. Rationale for the study

Occupational stress poses a significant threat to employees, and incurs both a health and an economic cost. Despite this, there are scant prevalence analyses of occupational stress within the South African setting. Furthermore, an examination of psychosocial risks may provide contextual evidence on which occupational stress

interventions can be based. Finally, the testing of relevant instruments is necessary to confirm their usefulness in terms of measuring occupational stress within local organisations. Therefore, a study of a South African workforce that assesses an appropriate occupational stress tool, determines the prevalence of work-related stress and explores significant risk factors may be of value.

1.3 Aim

To test instrument reliability, measure prevalence and analyze risk factors related to occupational stress in a South African organisational setting.

1.4. Research Objectives

A. To test the reliability of an internationally recognised occupational stress tool in a South African workforce setting.

B. To measure the prevalence and distribution of occupational stress in the administrative staff of a South African workforce.

C. To analyze contextual risk factors of occupational stress in the administrative staff of a South African workforce.

1.5. Arrangement of subsequent chapters

Chapter 2: This chapter will be presented in the form of a **literature review** and will attempt to glean information relevant to the study of occupational stress.

Chapter 3: A description of the study's **methodology** will be provided in this chapter. This will include details of study design, data collection and quantitative analysis techniques.

Chapter 4: This chapter will display the main **findings** of the study, in the order of: questionnaire reliability testing, prevalence analysis and risk factor assessment.

Chapter 5: A **discussion** of the implication of the findings, as well as an identification of study limitations, will then ensue.

Chapter 6: Finally, a summation of the occupational stress study will allow for the presentation of key **conclusions and recommendations**.

CHAPTER TWO

2. Literature Review

2.1. Chapter overview

This chapter will seek to provide a summary of selected literature pertinent to occupational stress, with a special emphasis on the South African context. It will begin by exploring a conceptual understanding of occupational stress. This will be followed by an examination of the epidemiology, psychosocial risks and outcomes of the disorder. The array of possible tools that could be used to measure stress, as well as approaches to managing stress in the workplace, will also briefly be examined. Finally, in the chapter's conclusion, key gaps in the literature related to occupational stress in the South African setting will be distilled.

2.2. Definitions of occupational stress

Before an exploration of the meaning of 'occupational stress' can be undertaken, a preliminary consideration of the more general concept of 'stress' is needed. While a range of definitions of stress have been offered, a useful synopsis is provided by Fisher et al.[12] They argue that any one of the following approaches to conceptualizing stress can be adopted (each being germane to the research process):

1) where stress is considered to be *dependent* (outcome) variable, or
2) where it is ascribed as an *independent* (input) variable, or

3) where it is seen an *intervening* variable, viz. “a psychological [,] cognitive and emotional variable … that takes place between stimulus and response.” [12(p.134)]

The last approach explores the dynamics between the person *(P)* and their environment (*E*). Stress is said to manifest when the demands made by *E* place sufficient strain on *P*’s resources and/or capacities (Fisher et al. appear to favour the intervening variable/P-E fit model of conceptualizing stress).[12]

What, then, is occupational stress? Definitions have ranged from the relatively simplistic (an “… adverse reaction people have to excessive pressures or other types of demand placed on them” [28 (p.1)]) to the more intricate (the “… emotional, cognitive, behavioural and physiological reaction to aversive and noxious aspects of work, work environments and work organisation” [29 (p.3)]). The National Institute of Occupational Safety and Health (NIOSH) offers a perhaps more balanced definition of occupational stress as being:

> “… the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker.”[30 (p.6)]

This succinct description, which also reflects some of the elements of the P-E model discussed earlier, will serve as the preferred definition of occupational stress for the purposes of this study.

2.3. Epidemiology

There is a considerable availability of prevalence data relating to occupational stress in developed countries. A report by *European Agency for Safety and Health at Work*,[23] for example, described epidemiological data from the EU. Drawing on different data sources, including the *Fourth European Survey of Working Conditions*,[6] it reported that, in 2005, an average of 22% of all EU workers experienced stress. The highest prevalences were seen in Greece (55%), Slovenia and Sweden (38%), and the lowest were in the United Kingdom (12%) and Ireland, the Netherlands and Germany (16%). Anxiety in the occupational setting was highest for workers in healthcare, education, public administration, defence, certain agriculture-related industries and forestry. Furthermore, it was reported that occupational stress was slightly more prevalent in males (23%) than in females (20%), and that the self-reporting that work affected their health was commonest amongst those in the 45 - 54 age group.[23]

In the United States, a survey study of adults 18 years and older (n=1568) was undertaken by the American Psychological Association in 2009.[5] Work was reported as being a significant source of stress by 69% of respondents. This reporting was slightly higher for males (70%) as compared to females (68%) and was highest in the 31 – 44 year old age group (75%).[5]

The NIOSH's 2004 *Worker Health Chartbook* explored a range of diseases experienced by workers in the United States. It showed that, in 2001, workers with 'anxiety, stress and neurotic disorders' had an average of approximately 25 days of

absence from work compared to six days for the entire non-fatal injury and illness group. Job categories with the highest levels of these disorders were 'technical, sales, and administrative support' (33.6%) and 'managerial and professional specialty' jobs (29.9%).[31]

There is a relative dearth of data related to the epidemiology of stress in developing countries. For example, although the WHO has stated that, in Latin America, "work-related stress is at present already acknowledged as one of the big epidemics of modern working life" [32 (p.12)] it was very difficult to identify the empirical data that could inform this. However, a large survey study of employed persons (n=1004) in a Hermosillo, Mexico, did find 26% of participants to be in 'high strain' jobs.[32,33]

More broadly, Kortum et al. undertook a qualitative study (involving a Delphi survey, expert interviews and focus group) that examined occupational stress in developing countries.[34] The study, which included participants from a number of regions/countries (including sub-Saharan Africa), highlighted the need to understand and address psychosocial risks in the workplace. The above notwithstanding, national prevalence data relating to occupational stress in South Africa could not be found.

2.4. Risk factors

The aetiology of occupational stress has been described as being multi-factorial.[35] The categorization of risk factors has been undertaken by Fisher et al.[12], Baker[35] and Michie,[13] and includes:

- *The work environment:* factors include exposure to physical hazards (such as noise and temperature extremes) and poor ergonomics.

- *Job characteristics:* factors include the experience of high work load, high time pressures, long working hours, complexity of work and variety of tasks

- *Organisational role(s):* factors include having to play multiple, conflicting and/or ambiguous roles within the workplace.

- *Organisational relationships:* factors include poor vertical relationships (with managers/supervisors) and horizontal relationships (with colleagues).

- *Career development:* factors include under or over promotion as well as job insecurity.

- *Home-work interactions:* factors include absence from home (due to work demands) as well as taking work-related tasks into the home environment.

Michie continues by describing the interface between risk factors and the physiological response at the individual level. Specifically, she describes how stressors illicit an “alarm response” (the acute flight versus fight reaction to a perceived workplace threat) or “adaptation” (a down-regulation of the response to stimuli in the work environment when they are no longer perceived as being threats). Stress arising when there is a dysfunction of, or a failed shift between, these responses.[13]

2.5. Outcomes

The sequelae of occupational stress can been clustered into physiological, psychological and behavioural outcomes.[35,36] Physiological outcomes include cardiovascular disease (such as hypertension), type 2 diabetes and peptic ulcerations; psychological outcomes include anxiety and mood disorders (such as depression) and behavioural outcomes include a decrease in productivity and absenteeism.[16,35,36] The latter group clearly has ramifications at both the individual and the organisational levels. A diagrammatic depiction of the interplay between risk factors, individual response(s) and outcomes, is given in figure 1.

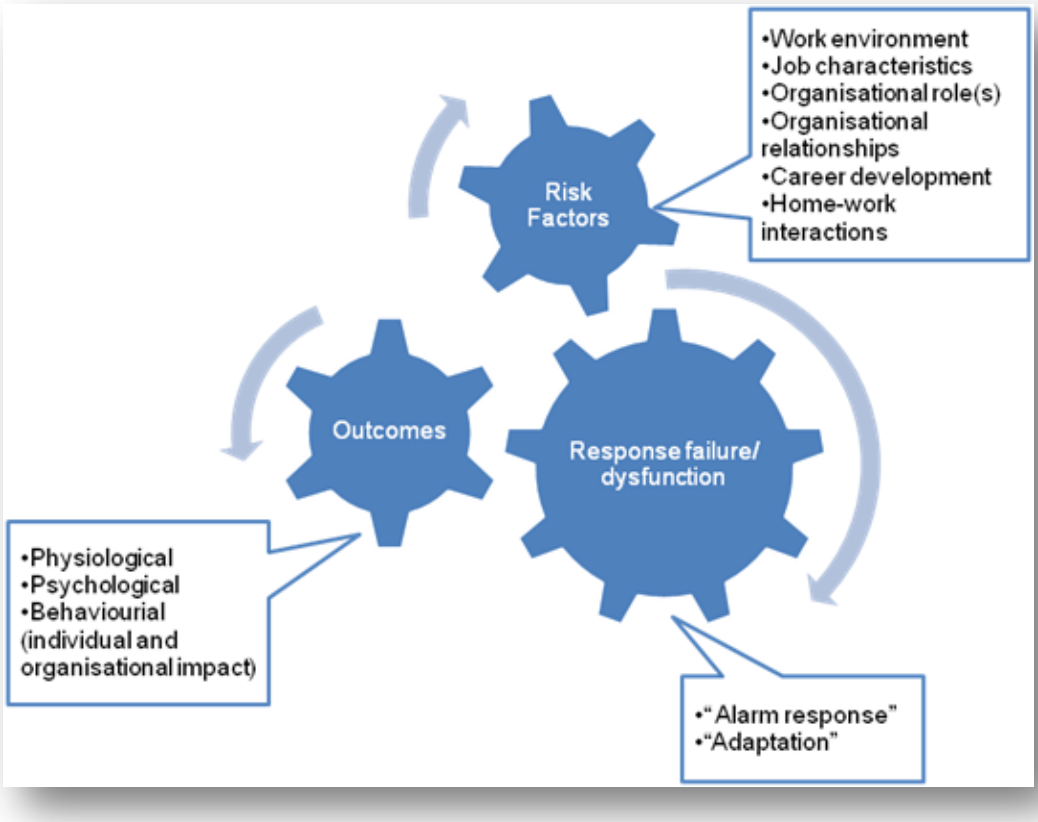


Figure 1: Risk factors, responses and outcomes of occupational stress

(Sources: Fisher et al,[12] Baker,[35] Michie,[13] Robbins and Judge[36])

Occupational stress' relationship with sleeping troubles and burnout appears to have also been extensively examined in the literature. A disruption in sleep patterns has been linked to the activation of the sympatho-adreno-medullary and hypothalamo-pituitary-adrenocortical pathways, which occurs as part of the stress response.[37,38] This results in the release of 'stress hormones,' such as cortisol, which precipitate insomnia and other sleep disturbances. These disturbances may, in turn, cause the release of more cortisol, potentially exacerbating the symptoms of stress and resulting in a negative cycle.[37–39]

Burnout has been described as "… a prolonged response to chronic emotional and interpersonal stressors on the job." [40 (p.397)] Foundational work undertaken by Maslach et al. resulted in the understanding of burnout as being the triad of: (1) emotional exhaustion, (2) depersonalisation and (3) the diminishment of personal accomplishment at work.[17,40] Burnout has, in turn, been associated with other psychological disorders. A study of health professionals in Norway (n=1476), for example, found a strong correlation between burnout and depression (r=0.72).[41]

2.6. Measuring Occupational Stress

2.6.1. Instruments

The literature identifies a number of instruments that can be used to measure occupational stress. Indeed, a WHO report compiled by Leka and Jain[27] summarized as many as 37 different measuring tools (used mainly in different regions in Europe).

These instruments, which range from broad measures of workplace stress to specific burnout inventories, are listed in table 1.

Table 1: List of occupational stress instruments

(source: Leka and Jain[27])

Burnout Measure	Pressure Management Indicator
Copenhagen Psychosocial Questionnaire	Psychosocial Working Conditions
Copenhagen Burnout Inventory	Stress Diagnostic Survey
Effort-Reward Imbalance	Stress d'organisation Questionnaire
General Nordic Questionnaire	Stress Profile
HSE Indicator Tool	Stress Risk Assessment Questionnaire
Job Characteristics Index	Travail et santé
Job Content Questionnaire	Tripod Sigma Questionnaire
Job Diagnostic Survey	Vragenlijst beleving en beoordeling van de arbeid
Job Stress Survey	Work Environment Scale
Maslach Burnout Inventory	Working Conditions and Control Questionnaire
Multidimensional Organisational Health Questionnaire	Canevas (company analysis)
NIOSH Generic Job Stress Questionnaire	Finnish Institute of Occupational Health (observational checklist)
Nova Weba Questionnaire	Position Analysis Questionnaire
Occupational Stress Index	RHIA/VERA (observational job-stress analysis)
Occupational Stress Indicator	Suvapro (checklist)
Occupational Stress Inventory	Travailleur et organisation (obervational checklist)
Occupational Stress Questionnaire	WEBA(welzijn bij of arbeid) (job-analysis instrument)
Oldenburg Burnout Inventory	

2.6.2. The Copenhagen Psychosocial Questionnaire

2.6.2.a Description

Due to its wide use, an instrument that warrants special consideration is the Copenhagen Psychosocial Questionnaire (COPSOQ). The first version of the COPSOQ was developed in Denmark in 1997 by Kirsten et al.[42,43] It was subsequently translated into several languages and has been used in numerous studies covering a range of occupational settings.[43] The following were among the stated objectives for the development of the questionnaire:

> "(i) to develop valid and relevant instruments for the assessment of psychosocial factors at work, (ii) to make national and international comparisons possible, (iii) to improve evaluations of interventions … " [42] (p.439)

The second (and current) version of the COPSOQ was developed using data from 3517 Danish workers collected in 2004/2005. Changes included the incorporation of values-related scales (such as *justice* and *trust)* as well as certain symptom-related scales (such as *stress, burnout and sleeping troubles).* Additional scales include *recognition* and *work-family conflicts* as well as items on offensive behaviour. Ultimately, 57% of the items in the first version of the COPSOQ were kept in the second version. [43]

The COSPOQ is presented in three formats: a long version of 128 items developed for researchers, a medium version for 87 items for the use of 'work environment professionals', and a short version of 40 items for workplaces.[44,45] The medium size COPSOQ, along with a detailed description of its scales, are provided in appendices 1 and 2 respectively.

2.6.2.b. Reliability testing

An important characteristic of a questionnaire is its reliability, that is, the extent to which repeated tests of its components produce results which are in agreement (this differs from validity, another important characteristic that can be defined as the extent to which instrument correctly measures which it is intended to measure).[46,47]

With regards to this, an acceptable level of reliability of different versions and adaptations of the COPSOQ has been reported in studies undertaken in several country-settings, including Denmark,[48] France,[49] Germany,[50] Spain[51] and Japan.[52] Although reliability testing of the entire COPSOQ in the South African setting could not be found in published literature, certain scales of the instrument were used (and found to be reliable) in the grey literature in the form of an academic dissertation completed at the University of Pretoria.[53]

2.7. Managing occupational stress

Having briefly described occupational stress measurement tools, different approaches to its management will now be considered. In the international context, a range of management models has been designed. The WHO, for example, has recommended a 'step-wise approach' to managing work-related stress in developing countries.[32] Other context-specific interventions guidelines include the European Framework for Psychosocial Risk Management (PRIMA-EF)[54] and The National Institute for Occupational Safety and Health's (NIOSH's) prevention model.[30] A summary of these models is provided in table 2.

Table 2: Management models of occupational stress

(sources: Houtman and Jettinghoff,[32] Leka and Cox[54] and NIOSH[30])

WHO 'step-wise' model	PRIMA-EF model	NIOSH prevention model
(1) Preparations and detecting signs of occupational stress.	(1) Assessment of psychosocial risks.	(1) Identification of problem by collecting and analyzing data related to stress.
(2) Analysis of risk factors & groups (through, for example, questionnaires).	(2) Analysis of existing practices/measures.	(2) Development and implementation interventions using evidence from step (1).
(3) Development of the action plan (covering both individual and organisational interventions).	(3-5) Development, implementation and evaluation of the action plan.	(3) Evaluation of interventions.
(4) Implementing the action plan.	(6) Development of organisational learning.	
(5) Evaluating interventions.	(7) Assessment of risk management outcomes.	

As can be observed, the identification and analysis of risk factors is the common 'first-step' in the models described. Hence it may not be appropriate (or, indeed, even possible) to develop and implement interventions without an adequate understanding of the risk factors specific to the workplace setting.

Generic models of occupational stress management, such as those described above, could not be readily found within the literature pertaining to the South African context. Instead, management recommendations/interventions tended to be specific to the findings of individual studies (as described in section 2.8.).

2.8. Studies specific to the South African setting

In terms of specific studies related to the South African setting, a literature search was conducted in an attempt to identify possible trends. Specifically, a search using the PubMed (www.ncbi.nlm.nih.gov/pubmed) and Directory of Open Access Journals (DOAJ) (www.doaj.org) engines was undertaken.

A total 45 studies were identified in PubMed and 17 in the DOAJ; however, three of these over-lapped, leaving 59 studies. A distribution of the studies, according to relevant categories, is given in table 3. As can be seen, most (53%) of the studies fell into the 'not applicable' category (because of they did not appear to focus on occupational stress and/or the South African setting).

Table 3: Results of search relating to occupational stress studies

(Database: PubMed and DOAJ;* term used: 'occupational stress in South Africa'*)

Profession-specific studies				**Not specific to a profession**	**Not applicable**
Health	***Security services***	***Education***	***Other professions***		
n = 13	n = 5	n = 3	n = 4	n = 3	n = 31
22 %	8 %	5 %	7 %	5 %	53 %

* Search undertaken on 18 February 2014

Of the studies that were applicable, most were specific to a professional category, with health, security service (such as police personnel) and education being mostly represented. Selected studies, that give some representation of the range and type analyses undertaken in each of these main professional groups, are outlined below.

2.8.1. Occupational stress and health professionals

In a 2006 study, Thomas and Valli assessed the levels of occupational stress amongst doctors in a public sector setting.[7] They analyzed data from a sample of doctors (n=50) working in the same public sector hospital. The sample represented a range of clinical disciplines, and included doctors completing their internship and community service as well as heads of departments. The results showed that doctors had lower job satisfaction and higher levels of perceived mental ill health as compared to normative mean scores. They also had higher levels of stressors across all sources of pressure measured as compared to normative means, with the differences being statistically significant ($p < 0.05$).[7]

Moving to the domain of nursing, Van der Colff and Rothmann examined the complex relationship between the following five factors: occupational stress, (a sense of) coherence, burnout, coping and work engagement.[55] Their study sample consisted of registered nurses (n=818) mainly from the Gauteng province. It was found that high levels of occupational stress, a low level of a sense of coherence and passive coping mechanisms (such as the venting of emotions) predicted both burnout and poor work engagement.[55]

2.8.2. Occupational stress in policing services

Literature on workplace stress experienced by police personnel in the South Africa setting can also be found. A germane study, undertaken by Pienaar and Rothmann in 2006, considered occupational stress in the South African Police Service (SAPS). The specific study objective was to develop (and validate) an instrument that could measure stressors experienced by SAPS officers. A cross-sectional design was selected and stratified random samples of police officer (n=2145) from eight out of the nine provinces in South Africa were obtained. Using a novel Police Stress Inventory, the study found there to be three “internally consistent” factors relating to occupational stress amongst SAPS personnel, namely: job demands, lack of support and crime-related stressors.[10]

2.8.3. Occupational stress in education settings

In terms of basic education, Emsley et al. undertook research involving school teachers (n=81) in Cape Town who had been declared permanently disabled due to a psychiatric illness. Most (66.8%) indicated that work-related stress had been an important contributing factor to their condition.[56]

Studies have also been conducted at the higher education level. Coetzee and Rothmann, for example, undertook a cross-sectional study of academic and support staff (n=372) at a South African university and found that physical and psychological stress levels among the study group to be higher than international norms.[8] A summary of key elements of the selected studies is provided in table 4.

Table 4: Summary of selected occupational stress studies in South Africa

Author(s)	Category	Participants	Assessment tools/methods	Main findings	Implications/recommendations
Thomas and Valli[7]	Health (Medicine)	Doctors representing a range of clinical disciplines in a public sector hospital (n = 50)	- Occupational Stress Indicator (OSI)	- Higher levels of perceived mental ill health and lower levels of job satisfaction as compared to normative scores. - Higher levels of stressors across all sources of pressure measures.	- Increase in organisational support/resources. - Introduction of targeted stress management.
Van der Colff and Rothmann [55]	Health (Nursing)	Registered nurses mainly from the Gauteng province (n = 818)	- Nursing Stress Inventory - Orientation to Life Questionnaire - Coping Orientation for Problem Experienced Questionnaire - Maslach Burnout Inventory-Human Services Survey (MBI-HSS) - Utrecht Work Engagement Scale	- Occupational stress was due to high work demands and poor organisational support - Stress was, in turn, associated with emotional depletion and a sense of depersonalization	- Increase in organisational support/resources. - Introduction of stress management (specifically coping strategies). - Provision of clear information with regards to work expectations. - Reduction of job demands. - Education related to coping strategies. - Enhancement of relationships with the professional team (e.g. with doctors).
Pienaar and Rothmann[10]	Police	SAPS personnel from eight provinces (n = 2145)	- Police Service Inventory	- Three “internally consistent” factors related to occupational stress were identified, these were: job demands, lack of support and crime-related	- Increase in organisational support/resources. - Introduction of targeted stress management.

				stressors.	
.	Education (Basic)	Teachers in Cape Town (who had been declared permanently disabled due to psychiatric condition) (n = 81)	- Semi-structured psychiatric interview - Patient record review - Collateral information	- Relatively young participants (mean: 44 years; SD: 6.1); most (67%) indicated that work-related stress had been an important contributing factor to their condition.	- Reduction of job demands (decrease workload) - Better discipline in class-room (reduced stressor). - Early identification of vulnerable staff members.
Coetzee and Rothman[8]	Education (Higher)	Academic and support staff at a higher education institution (n = 372)	- An Organisational Stress Screening Tool (ASSET)	- They were higher levels of occupational stress as compared to international norms.	- Increase in organisational support. - Changes in decision-making processes (e.g. “consensual decision-making”).. - Increased organisational commitment (individuals’ commitment to organisation & vice versa). - Development of a equitable reward and resource distribution system.

2.9. Summary of literature review

This brief survey has endeavoured to provide a description of some of the key literature relevant to occupational stress. Epidemiological studies have revealed a relatively high prevalence of occupational stress within different country settings, with prevalences varying by age-group and industry type.

Occupational stress was shown to be multi-factorial in terms of risks, and its outcomes could be categorized into physiological, psychological and behavioural sequelae (with the latter having implications for both the individual and the organisation). While a range of measurement tools were identified in the literature, particular attention was given to the COPSOQ due to its wide use and extensive reliability testing. Finally, generic models of occupational stress management were identified, and importance of assessing psychosocial risks was highlighted.

Finally, key research gaps pertaining to the South African setting that have been revealed through the literature review process are:

1. **Lack of specific instrument (questionnaire) reliability studies**. Studies that concentrate mainly on the reliability testing of occupational stress questionnaires in international settings were discovered in the literature (e.g. Thorsen and Bjorner[48]). However, there has not been a similar focus within the South African setting.

2. **Limited general prevalence data and occupational focus within the South African setting.** There are no nationally representative epidemiological data available for occupational stress. Furthermore, local studies have tended to focus on stress in specific professions (such as education, health and police services). The consideration of other occupations would allow for better comparative analysis as well as delineation of the extent of occupational stress in the country.

3. **Paucity of occupational stress intervention analysis within the South Africa setting**. There appears to be a need for more studies on the development of work-related stress management models appropriate to South African workforces. An important step towards this would be greater analysis of contextual psychosocial risk factors related to occupational stress.

The research gaps identified above articulate, to a considerable extent, with the study objectives of instrument testing, prevalence measurement and risk factor analysis in a South African workforce setting.

CHAPTER THREE

3. Methodology

3.1. Chapter overview

This chapter will provide details of the methodological approach adopted in the study. It will include a description of the study's design and setting; will provide information on the target population and sampling technique undertaken, and will discuss the data collection and analysis employed in terms of instrument reliability testing, prevalence measurement and risk factor analysis.

3.2. Study design

A cross-sectional descriptive and analytical study was undertaken using primary data.

3.3. Study setting

The study was based at Chris Hani Baragwanath Academic Hospital (CHBAH), a large tertiary healthcare facility based in Soweto, Johannesburg. Opened in September of 1942, CHBAH is one of the largest hospitals in the world. It occupies 0.70 km^2 of land, has approximately 6760 members of staff and 3200 hospital beds.[57,58] Along with Charlotte Maxeke Johannesburg Academic Hospital, Rahima Moosa Mother and Child Hospital and Helen Joseph Hospital, CHBAH is one of the

teaching hospital of the University of the Witwatersrand, and is funded and administered by the Gauteng Department of Health.[57]

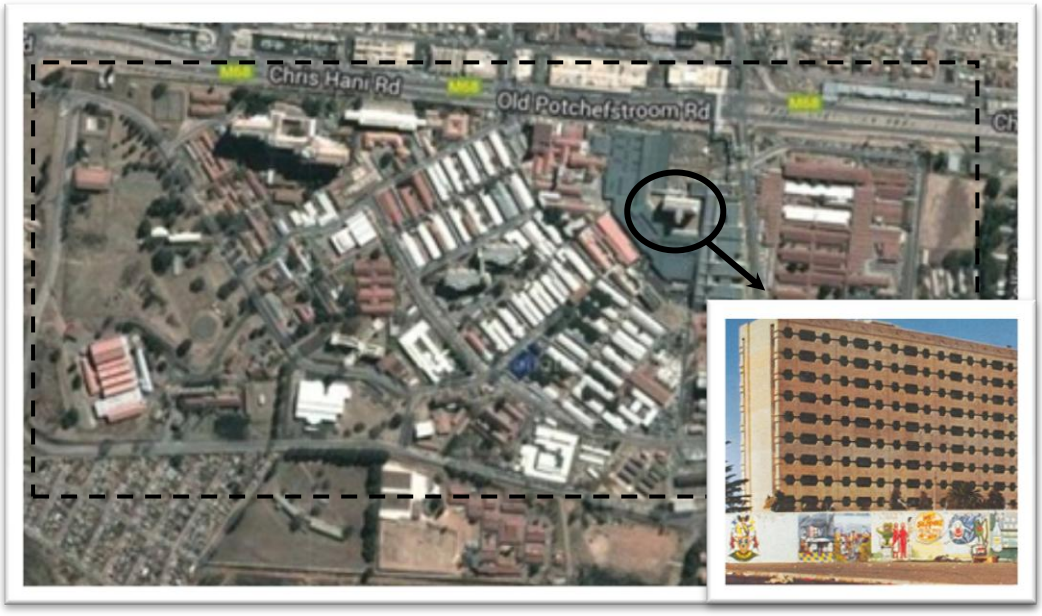


Figure 2: View of Chris Hani Bargawanath Academic Hospital

Aerial image, with insert of Administration Building

(Sources: Google Maps;[59] University of the Witwatersrand[60])

3.4. Target population

The target population was the administrative staff of CHBAH as of 31 December 2012. The administrative component of the staff establishment was selected because it was assumed that the findings would be more generalizable to other South African administrative workforce settings in many industries (as compared to, for example, focusing on medical doctors or nurses where the results may have only been applicable to other health workforces).

3.5. Study period

Primary data were collected between February and September of 2013.

3.6. Sampling approach

A stratified sample technique was undertaken. Data of administrative staff were provided by the human resources department of the hospital. Data fields included the names, job titles and paypoint descriptions of staff. Using these data, staff members were then stratified into:

- Front line staff: these were staff members who were assumed to engage regularly with patients/clients. Examples include ward clerks and patient affairs staff.

- Back office staff: these were staff members who dealt with administrative duties that were assumed to seldom involve direct patient/customer interface. Examples include staff members from the revenue or asset management departments.

- Managers: this included only staff members with the title ‘middle manager’ in the job description field. Other categories of management were too few to provide an adequate sample size.

Distinctions between these categories of staff can be found in the literature.[61] Moreover, the rationale for the stratification approach was that the different groups sampled would, potentially, have different experiences with regards to workplace stress. Differences in stressors and coping mechanisms have, for example, been demonstrated between managerial and clerical staff.[62,63]

Simple random sampling was undertaken for the selection of front line and back office staff. Details of the sizes of the total, sampled and respondent groups are given in table 5 below. The slight differences in the target population and study sample proportions resulted from the exclusion of certain potential participants from the sampling frame, as is discussed in section 3.7. Furthermore, because the management stratum was relatively small (n=31), the entire group was sampled.

Table 5: Number of employees in the target population and sampling groups

Job category/strata	Target population	Sampled group	Final respondents	Final response
Front line staff	347	147	54	37 %
Back office staff	409	173	90	52 %
Managers	31	31	22	71 %
Total	787	351	166	47 %

3.7. Sample size calculation

Sample sizes need to be calculated in order to give an acceptable margin of error and statistical power (1-β).[64,65] With regards to this study, a margin of error of 10% (at the 95% confidence level) with a statistical power of 0.80 for detecting the outcome of *stress* was determined to be acceptable. The sample size was calculated

on the margin of error estimates prospectively, and power was then calculated retrospectively (as there was no baseline prevalence data for the target population). An online statistical tool (http://www.raosoft.com/samplesize.html) and STATA (version 12) were used to carry out the calculations.

According to data provided by CHBAH, a total of 838 employees were on the administration staff establishment as of 31 December 2012. Of these 51 were excluded from the sampling frame either because their numbers, in terms of job type, were too small or because their work activities did not readily fit into one of the three job categories identified for the purposes of stratification. The final study population was therefore 787. Using this number, a sample size of 350 would have been required to achieve a margin of error of 3.9 % - the lower margin of error reflected of an anticipated low response rate (351 potential participants were included in the sampled group).

The total response rate was 48.4% (n=170). Four participants were also excluded from the respondent group either because their actual activities did not fit into one of the strata or because basic data (such as *age group* and *sex*) were missing. This gave a final response rate of 47.3% (n=166). Using this number, the margin of error was recalculated to be 6.8% (at the 95% confidence level) with a post-hoc calculation of power > 0.90; these values were well within the set level of acceptability.

3.8. Data collection and entry

The research team consisted of the principal investigator, staff from the National Institute for Occupational Health (NIOH) and fieldworkers. Primary data were collected by the research team using the second version of the COSPOQ (attached in appendix 1), which was self-administered. Selected participants were either met in their offices/departments, or called to special meetings where the study was carefully explained. Consent was then obtained from those willing to participate. It was estimated that the COPSOQ would take approximately 30 minutes to complete.

Data from the close-ended items of the received COPSOQs were entered into Microsoft Excel. The manual double-entry of data is considered to be good practice in term of entering paper-based data into an electronic format.[66] In this study, data were double-entered and Epi Info™ was used to compare completed data sheets until no differences could be detected. Data were then imported into STATA (version 12) for final preparation before analysis.

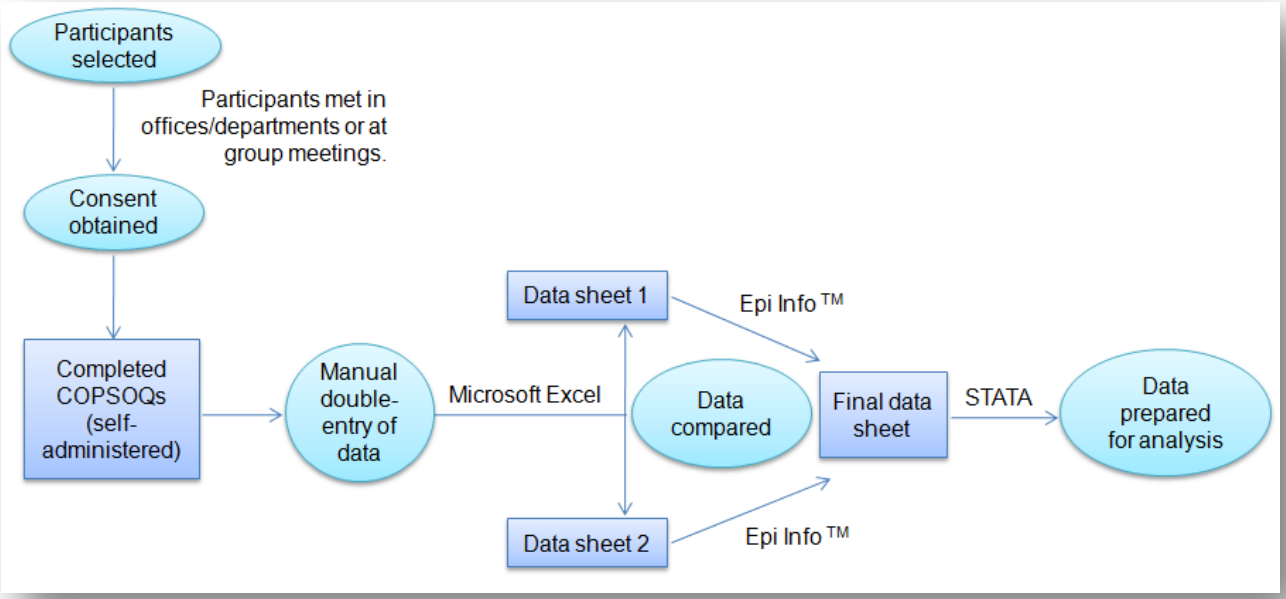


Figure 3: Flow of data collection and entry

3.9 Data analysis

3.9.1. Software used for statistical analysis

Data were analyzed using STATA (version 12) and Microsoft Excel.

3.9.2. Variables

Table 6 provides a description of the variables used in data analysis.

3.9.2.a. Demographic variables

- *Gender*

  This was a simple dichotomous variable of male or female.

- *Age group*

  Categories/groups were used as described in the COPSOQ:

  - Under 30 years
  - 30 to 39 years
  - 40 to 49 years
  - 50 to 59 years
  - 60 years or more

- *Job categories*

  These were the categories used during the stratification process:

  - Front line staff
  - Back office staff
  - Managers

Table 6: Demographic, exposure and outcome variables used in analysis

Variable group	Variable name	Variable type	Data source
Demographics	Gender	Categorical (nominal)	COPSOQ data field
	Age group	Categorical (nominal)	COPSOQ data field
	Job category	Categorical (nominal)	Added during stratification
Exposures	*Quantitative demands*	Numerical	COPSOQ scale
	Work pace	Numerical	COPSOQ scale
	Emotional demands	Numerical	COPSOQ scale
	Influence	Numerical	COPSOQ scale
	Possibilities for development	Numerical	COPSOQ scale
	Meaning of work	Numerical	COPSOQ scale
	Commitment to workplace	Numerical	COPSOQ scale
	Predictability	Numerical	COPSOQ scale
	Rewards (recognition)	Numerical	COPSOQ scale
	Role clarity	Numerical	COPSOQ scale
	Role conflicts	Numerical	COPSOQ scale
	Quality of leadership	Numerical	COPSOQ scale
	Social support from colleagues	Numerical	COPSOQ scale
	Social support from supervisors	Numerical	COPSOQ scale
	Social community at work	Numerical	COPSOQ scale
	Job satisfaction	Numerical	COPSOQ scale
	Work-family conflict	Numerical	COPSOQ scale
	Mutual trust between employees	Numerical	COPSOQ scale
	Trust regarding management	Numerical	COPSOQ scale
	Justice and respect	Numerical	COPSOQ scale
	Offensive behaviour	Numerical	Composite of COPSOQ scales
Outcomes	*Self-rated health*	Numerical	COPSOQ scale
	Sleeping troubles	Numerical	COPSOQ scale
	Burnout	Numerical	COPSOQ scale
	Stress	Numerical	COPSOQ scale

3.9.2.b. Exposure and outcome variables

Exposure and outcome variables were selected from the COPSOQ scales. Descriptions of these scales are provided in the medium-size questionnaire guidance document (appendix 2). As is detailed in the document, each scale is comprises one to four of questions/items. Each item, in turn, is arranged in a Likert scale of four or five points. The points are equally weighted and assigned a score between 0 and 100 in an ordinal progression (for example, scores on a 5-point item would be 0, 25, 50, 75 and 100). The scores from each item in a scale can then be averaged, and individual and/or group means can be calculated for each scale. In this way, the ordinal data of the scales are effectively transformed into numerical data.

Exposure variables

Mean values from the following scales were used as exposure variables in the study (the variables are arranged into groups as identified by Thorsen and Bjorner[48], with the number of items in each variable/scale used provided in brackets).

- "Demands at work" variables:[48] *quantitative demands* (4), *work pace* (3) and *emotional demands* (4)

- "Work organisation and job contents" variables:[48] *influence* (4), *possibilities for development* (4), *meaning of work* (3) and *commitment to workplace* (4).

- "Interpersonal relations and leadership" variables:[48] *predictability* (2), *rewards (recognition)* (3), *role clarity* (3), *role conflicts* (4), *quality of leadership* (4),

social support from colleagues (3), *social support from supervisors* (3) and *social community at work* (3).

- "Work-individual interface" variables:[48] *job satisfaction* (4) and *work-family conflict* (4).

- "Values at the workplace" variables:[48] *trust regarding management* (4), *mutual trust between employees* (3) and *justice and respect* (4).

- In addition to the above, an *offensive behaviour* variable was included. *Offensive behaviour* does not appear as a single scale in the COPSOQ scales guidance document (appendix 2), but rather as description of a group comprising individual scales which assessed if any of the following had been experienced in the last year: *physical violence*, *threats of violence*, *bullying* and *sexual harassment*.[43] However, because data from these items showed such a low prevalence (as detailed in the section 4.4) they were, for the purposes of this study, combined to form a single outcome variable.

Outcome variables

Mean values of the following variables were used to describe outcomes (details of these COPSOQ scales can be found in appendix 2)

- *Self-rated health:*

This was composed of a single item, and is the only positive outcome variable.

- *Sleeping troubles:*

  Items related mainly to issues of insomnia.

- *Burnout:*

  Items pertain to burnout symptoms experienced in the last four weeks.

- *Stress:*

  Items, again, relate only to symptoms experienced in the last four weeks. This is, by definition, the primary variable of concern in the study. In terms of measuring *stress* as an effect, the concept of a minimal important difference (MID) needs to be briefly explained. Shi et al. have defined the MID as:

  > "… the smallest change in a score for a patient that indicates an actual change between two time points; that is, the MID is the minimum change in a score that likely reflects actual change rather than a variation in measurement." [67 (p.1)]

  The MID has frequently been used as a measure in quality of life studies.[68,69] In terms of the COPSOQ, a study related to the first version of the questionnaire found that, for most of the scales, 0.5 of the standard deviation (SD) represented a MID. This value is, therefore, used to calculate the effect measure in this study.

As there is no baseline measure of *stress* in the target population, the average values presented in the COPSOQ scales guidance document (appendix 2) and the original study by Pejtersen et al.[43] were used as the references/baselines. As they reported an average score for *stress* of 26.7 and a SD of 17.7, any score above 35.55 (that is, the reference mean of *stress* + MID) was considered to be indicative of the presence of *stress*.

3.9.2.c. Distribution of numerical variables

Analysis of skewed data requires either transformation (such as through logarithmic calculations) or the use of non-parametric methods.[65] For this reason, the distributions of data for exposure and outcome variables were first assessed using the STATA skewness test. This allowed for the identification of non-normal distributions (detailed in table 7) and, subsequently, the employment of the appropriate non-parametric testing.

Table 7: Non-normally distributed numerical variables

Skewness test		
	Adjusted chi-squared	p > chi-squared
Meaning of work	24.85	< 0.001
Commitment to workplace	8.14	0.017
Predictability	9.74	0.008
Rewards (recognition)	11.96	0.003
Role clarity	24.54	< 0.001
Social support from colleagues	10.34	0.006
Social support from supervisors	11.51	0.003
Social community at work	14.69	< 0.001
Work-family conflict	7.71	0.021
Justice and respect	8.43	0.015

3.9.3. Description of study sample

The analysis commenced with a brief description of the study sample. Frequencies, proportions and ratios were used for describing the demographic variables of *sex*, *age group* and *job category* (as these are appropriate measures of nominal data).[65]

3.9.4. Reliability testing

In terms of meeting the first research objective, an analysis of the reliability of the COPSOQ in the study setting was undertaken. Internal consistency, or the extent to components of an instrument relate to one another and measure the same characteristic, is an important gauge of the reliability of a questionnaire.[65]

With regards to this, the Cronbach's alpha was used to assess the reliability of the COPSOQ in the study setting. Cronbach's alpha is a numerical coefficient (ranging from 0 to 1) that is frequently used to test internal consistency[70,71] and has, indeed, been utilized in assessments of the COPSOQ.[49,51] Data from the study sample were used to calculate alpha values for all of the scales, which were then compared to the original alpha values of the second version of the COPSOQ reported by Pejtersen et al.[43]

A number of suggestions have been made with regards to limits of acceptability in terms of alpha values. An alpha $\geq$ 0.7 has generally been considered to be indicative of reliability, while levels < 0.5 have been deemed unacceptable.[71–73] On the upper end, it has been argued that although higher alpha levels are desirable,

values above 0.9 may actually indicate redundancy and could suggest a need to reduce the length of the test (by, for example, removing potentially repetitive items).[72] Table 8 shows the values that will be used as a reference for this study.

Table 8: Threshold guideline for Cronbach's alpha values

(sources: Tavakol and Dennick;[72]Gliem and Gliem[73])

	alpha value
Possible redundancy	>0.9
Good	>0.8 to ≤0.9
Acceptable	>0.7 to ≤0.8
Questionable	>0.6 to ≤0.7
Poor	>0.5 to ≤0.6
Unacceptable	<0.5

3.9.5. Prevalence measurement

3.9.5.a. Variable analysis

An analysis of all of the exposure and outcome variables was undertaken. Moreover, differences between the study outcome and exposure variables and the reference values provided by the COPSOQ scales guidance document (appendix 2) were then analyzed. This involved one sample t-tests for normally distributed data and the Wilcoxon signed-rank test (non-parametric) test for non-normally distributed data.[65,74]In keeping with the conventional reporting of measures of central tendency and spread, variables with normally distributed data were described in terms of means with SD, while non-normally data were reported as medians with the inter-quartile range (IQR).[65]

3.9.5.b. Description of stress data

Data relating to *stress* were then analyzed in greater detail. *Stress* was described in relation to the demographic variables, and key findings (in terms of higher prevalences) were reported.

3.9.5.c. Stress and other outcome variables

Stress was further related to the other outcomes of *burnout*, *sleeping troubles* and *self-rated health* using paired t-tests. To determine if there was a linear relationship between *stress* and these variables, the Pearson product moment, or correlation coefficient (r), was also calculated.[65]

3.9.5.d. Analysis of variance in relation to stress

The variance of *stress* with regards to the demographic variables was assessed. As these independent variables were all categorical and the dependent variable (*stress*) was a normally distributed continuous, numerical variable, a two sample t-test was used for *sex* and a one-way analysis of variance (ANOVA) was conducted for *age group* and *job category*.[74] Where a significant difference was detected, the demographic variable concerned was also tested in relation to each of the exposure variables (using either the one-way ANOVA or the Kruskal-Wallis test for normally or non-normally distributed data, respectively[74]). This was because an association with both the outcome and exposure variables would suggest potential confounding.[65]

Finally, a test for homogeneity was conducted to determine if there was any effect modification by the relevant variable(s).[75]

3.9.6. Analysis of risk factors

3.9.6.a. Test for multicollinearity.

Multicollinearity describes a linear relationship between exposure variables, and is an important consideration in multivariate regression modelling.[76] To assess the presence, or level, of multicollinearity, all of the exposures were first regressed against *stress*, and variance inflation factors (VIFs) were measured. The suggested cut-off of $\sqrt{VIF}$ = 2 was used as the upper limit (any value above this would be considered to indicate an unacceptable level of collinearity).[77]

3.9.6.b. Logistic regression

Logistic regression allows for the analysis of potential associations between a single categorical dependent variable and a one or more independent exposure variables; these associations can be expressed in terms of odds ratios (ORs).[78] The simple logistic regression undertaken in this study involved the following steps:

- Creation of binary variables: Binary variables were created for all of the exposure variables. In all instances (expect for one) this involved using the reference values in the COPSOQ scales guidance document (appendix 2) as cut-off points. For example, the binary of the *quantitative demands* variable

would be 0 if less than or equal to 40.2, and 1 if greater than this value. The exception to this was the offensive behaviour variable where exposure to any *physical violence*, *threats of violence*, *bullying* and/or *sexual harassment* was given the value of 1 while no exposure was 0. This was because there was a relatively low prevalence of the individual components of *offensive behaviour* (as described in 4.4).

A *stress* binary was created as the dependent variable for the logistic regression modelling. The reference mean plus the MID (0.5 SD) was used as the threshold for *stress*. As a result, any value greater than or equal to 35.55 was 1, and any value less than this was 0.

- Bivariate logistic regression: Bivariate analysis was then carried out to determine ORs between *stress* and individual exposures. The null hypothesis was that no such relationship existed – only in instances where this could be rejected with a *p*-value < 0.2 were the exposure variables carried over into multivariate analysis. Furthermore, any variable derived from a COPSOQ scale with a Cronbach's alpha value < 0.5 was also excluded at this stage because this level of reliability was considered to be too low for inclusion in final modelling.[73]

- Multivariate logistic regression: Exposure variables that survived the bivariate round of analysis were then entered into a forward step-wise regression model. Step-wise regression involves both the forward and backward selection of variables to be entered into the prediction equation.[65,79] The

variable removal cut-off was set at a significance level $p \geq 0.2$, and the variable addition level at $p < 0.05$. For all multivariate analyses, the STATA 'lockterm' command was used to keep *job category* in the modelling.

Because differences in terms of exposures and responses to occupational stress have been described between males and females,[80–82] further logistic regression was conducted to assess if there were any dissimilarities in risk factors by *sex.*

- Goodness-of-fit of the model: The final multivariate logistic model was subjected to the Hosmer and Lemeshow's goodness of fit test. A value of $p \geq 0.05$ was interpreted to be acceptable with regards to the model's fit to the data.[65]

- Predictive performance of the model: Receiver operating characteristic (ROC) curve analysis was also undertaken. ROC curves can be used to test the predictive performance of logistic models.[83,84]

  For this test, the model's ability to predict *stress* (using the binary definition) based on statistically significantly exposures was determined by calculating, and graphically displaying, the area under the ROC curve.

It is important to note that an *a priori* argument was applied here: *stress* would only be defined as being work-related, or occupational, if a statistically significant harmful relationship, in terms of OR, was shown between at least one of the exposure

variables (which were all work-based) and *stress*. Indeed, if no such relationship existed, then the *stress* described in the study could not be labeled as occupational stress.

3.9.6.c. Ordinal logistic regression

Ordinal logistic regression applies when the dependent variable data are in the form of a number of ordered categories.[78] This was used an additional analytical approach for the purpose of examining potential associations related to different levels of *stress*. Moreover, while the initial logistic regression modelling sought to answer the question of which variables would be significant between no *stress* and *stress* (in terms of MID), the ordinal regression aimed to identify variables that would be significant between a lower level of *stress* and a higher one.

In order to conduct this type of regression, orders/levels of *stress* had to first be determined. This involved clustering the employees who had *stress* into distinct groups of at least 30 people each (so as to avoid the statistical challenges of dealing with smaller group sizes).[85]

Using MIDs as basic units, a *low stress* group ($\geq$ 1 MID and < 3 MID) and a *high stress* group ($\geq$ 3 MID) were, ultimately, utilized as the dependent variables in the ordinal regression - this allowed for the analysis of two groups of appropriate size.

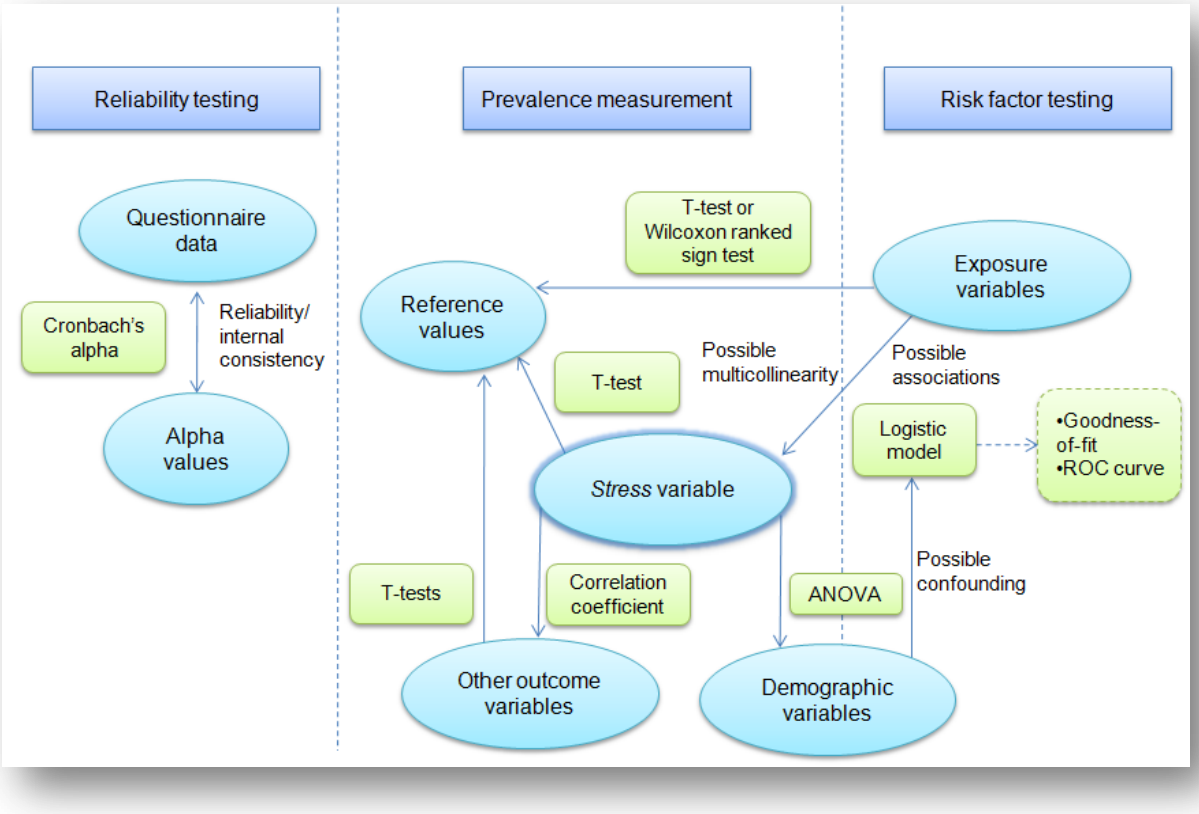


Figure 4: Flow of data analysis

3.10. Ethical considerations

3.10.1. Permission

Ethical approval to conduct the research was obtained from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand (clearance certificate: M120920) on 28 September 2012 (appendix 3). Permission to conduct to research was also sought, and obtained, from the Medical Advisory Committee of CHBAH of 23 January 2013 (appendix 4).

3.10.2. Consent and anonymity

Kristensen has developed “soft guidelines” for surveys that use the COPSOQ.[86] One of the recommendations is that all participants should be made anonymous, and that active consent be obtained if the study group consists of less than 15 persons. Part of the rationale behind this is that, given the small size of the group, individuals may be concerned about their anonymnity.[86]

Even though the aim was to obtain a sample size substantially larger than 15, active consent was still sought from individuals participating in this study. Respondents were asked to sign a consent form (appendix 5) before completing the questionnaire. Furthermore, a study information sheet, explaining the nature of the research and addressing some of the possible questions that may be asked, was also provided (appendix 6). With regards to anonymity, unique study numbers were assigned to participants and these were recorded (instead of names) on the consent form and the questionnaire. In this way, the identities of the respondents were kept secure.

CHAPTER FOUR

4. Results

4.1. Chapter overview

This chapter will detail the main findings of the study. It will begin by reporting on summative data of the study sample. Results of the reliability testing of the COPSOQ will then be described, followed by prevalence measurement findings related to *stress* and other variables. Finally, the data produced through analysis of risk factors will be presented; this will include key findings of both the simple and ordinal logistic regression modelling.

4.2 Description of the study sample

The study sample was described in terms of the demographic variables of *age group, sex* and *job category*. Most respondents (84.3% of the total sample) were between 30 and 59 years of age, with the largest single group being females in the 30 to 39 years age group (21.7%). There was a greater female:male employee ratio in the overall sample (1.8:1), a general pattern that held true in all job categories except for the managers group, were the female:male ratio was almost reversed (1:1.75). Indeed, a chi-squared test revealed a statistically significant difference between *job category* and *gender* ($p = 0.007$).

Managers represented the smallest *job category* group (13.3%), while back office staff was the largest (54.2%). Details of distributions according to demographic variables are given in tables 9 and 10.

Table 9: *Sex* distribution by age group

	Females		Males		Group % of total sample
Age group	**n**	**% of total sample**	**n**	**% of total sample**	
Under 30 years	12	7.2%	7	4.2%	11.4%
30 to 39 years	36	21.7%	19	11.4%	33.1%
40 to 49 years	27	16.3%	17	10.2%	26.5%
50 to 59 years	26	15.7%	15	9.0%	24.7%
Over 60 years	6	3.6%	1	0.6%	4.2%
Total	**107**	**64.5%**	**59**	**35.5%**	100.0%

Table 10: *Sex* and *age group* distribution by *job category*

	Front line staff (n)	Back office staff (n)	Managers (n)	Total (n)
Gender				
Male	20	25	14	59
Female	34	65	8	107
Age group				
Under 30 years	5	14	0	19
30 to 39 years	11	42	2	55
40 to 49 years	18	17	9	44
50 to 59 years	18	13	10	41
Over 60 years	2	4	1	7
Job category total	**54**	**90**	**22**	**166**
Job category total (%)	**32.5%**	**54.2%**	**13.3%**	**100.0%**

4.3. Reliability testing

The reliability scores of the COPSOQ within the study setting, in terms of Cronbach's alpha values, are given in table 11. A score for *self-rated health* was not included as this was a single-item scale; an alpha value could, therefore, not be calculated.

Table 11: Reliability of scales using Cronbach's alpha

Scale groups (from Thorsen and Bjorner[48])	Scale	Respondents (n)	Study sample (alpha)	Reference (alpha)*
Demands at work	Quantitative demands	160	0.61	*0.82*
	Work pace	160	0.68	*0.84*
	Emotional demands	162	0.52	*0.87*
Work organisation and job contents	Influence	160	0.54	*0.73*
	Possibilities for development	161	0.31	*0.77*
	Meaning of work	164	0.39	*0.74*
	Commitment to workplace	162	0.65	*0.77*
Interpersonal relations and leadership	Predictability	164	0.55	*0.74*
	Rewards (recognition)	165	0.75	*0.83*
	Role clarity	162	0.58	*0.78*
	Role conflicts	163	0.60	*0.67*
	Quality of leadership	165	0.85	*0.89*
	Social support from colleagues	165	0.70	*0.70*
	Social support from supervisors	164	0.82	*0.79*
	Social community at work	165	0.60	*0.86*
Work-individual interface	Job satisfaction	162	0.72	*0.82*
	Work-family conflict	165	0.71	*0.80*
Values at the workplace	Mutual trust between employees	164	0.56	*0.77*
	Trust regarding management	164	0.62	*0.80*
	Justice and respect	163	0.76	*0.83*
Health and well-being	Sleeping troubles	164	0.82	*0.86*
	Burnout	163	0.83	*0.83*
	Stress	163	0.80	*0.81*

*COPSOQ scales guidance document (appendix 2).

As is demonstrated, there was a wide range of alpha values in the study sample data (0.31 to 0.85) as compared to the reference data (0.67 to 0.89). Low alpha values were seen in the 'work organisation and job contents' group of scales in the sample data, which were also relatively low in the reference values, while high alpha values were observed in the 'health and well-being' group of scales (which consist of most of the measures used as outcome variables, including *stress*). The *offensive behaviour* scale is not included in table 11 because it was composed of individual, single-item COPSOQ scales (as described in section 3.9.2.b) and, therefore, did not have a reference value. However, an alpha of 0.56 was calculated for this scale.

Table 12 shows the percentages of scales using the alpha acceptability thresholds (discussed in section 3.9.4). A graphical display of the sample and reference alpha values, against the lower threshold value of 0.5 and the upper limit at 0.9, is given in figure 5. As can be seen, the scales of *possibilities for development* and *meaning of work* in the study sample fall below the lower threshold of reliability.

Table 12: Performance of scales in terms of reliability thresholds

(sources: Tavakol and Dennick;[72] Gliem and Gliem[73])

	Proportion of scales from study sample
Possible redundancy (> 0.9)	0%
Good (>0.8 to ≤0.9)	16.7%
Acceptable (>0.7 to ≤0.8)	20.8%
Questionable (>0.6 to ≤0.7)	20.8%
Poor (>0.5 to ≤0.6)	33.3%
Unacceptable (< 0.5)	8.3%

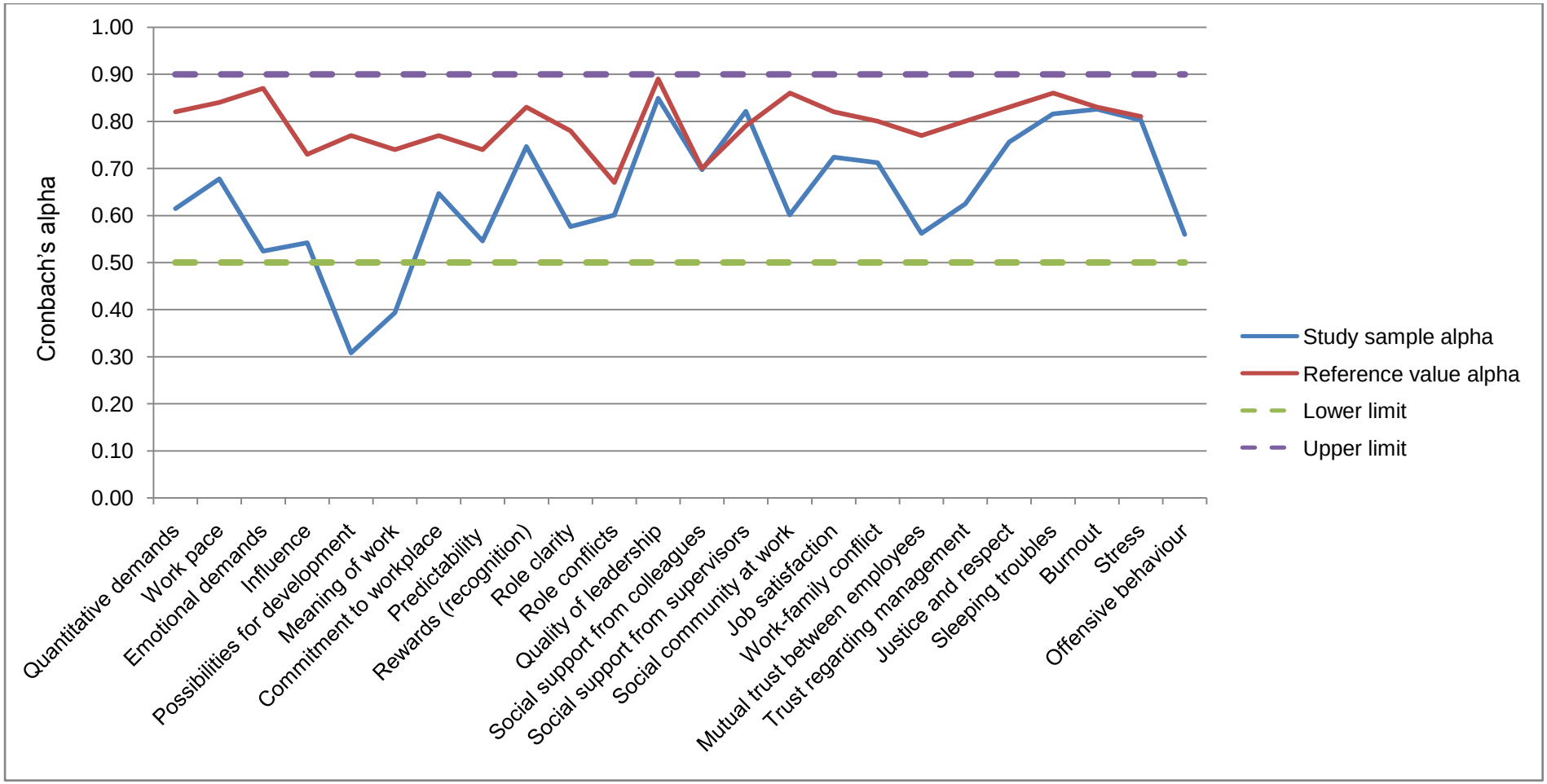


Figure 5: Cronbach's alpha values with upper and lower threshold limits

4.4. Prevalence measurement

4.4.1. Variable analysis

Before focusing on prevalence with regards to the *stress* variable, a 'snapshot' of the sample data related to all of the exposure and outcome variables will be provided. This is shown in table 13. The variable data are statistically significantly different ($p < 0.05$) compared to the reference average for all of the variables except for *predictability*, *rewards (recognition), quality of leadership* and *social community at work*.

In terms of exposure variables, the employees reported a higher *work pace* and greater *emotional demands* at work as compared to the reference values. They reported that they had less *influence*, and that there were greater *role conflicts*. There were also lower levels of *job satisfaction*, *mutual trust between employees, trust regarding management* and *justice and respect* in the workplace. Although there was no reference mean for *offensive behaviour,* prevalence values for the individual components were available. This is shown in table 14. As can be seen, there was a higher exposure to all of the types of *offensive behaviour* in the study sample, especially with regards to *physical violence* and *bullying*.

Finally, the means of all of the outcome variables (including *stress*) were statistically significantly higher in the sample data, except for *self-rated health*, which was significantly lower.

Table 13: Results of exposure and outcome variable analysis

Scale groups (from Thorsen and Bjorner[48])	Variable	Study sample	Reference values, mean (+/- SD)*	*p*-value
Demands at work	Quantitative demands	37.2 (20.5) [i]	40.2 (20.5)	0.034
	Work pace	64.6 (23.3) [i]	59.5 (19.1)	0.003
	Emotional demands	46.2 (21.4) [i]	40.7 (24.3)	0.001
Work organisation and job contents	Influence	46.5 (22.4) [i]	49.8 (21.2)	0.032
	Possibilities for development	69.2 (17.7) [i]	65.9 (17.6)	0.010
	Meaning of work	83.3 (66.7-91.7) [ii]	73.8 (15.8)	< 0.001
	Commitment to workplace	68.8 (50.0-87.5) [ii]	60.9 (20.4)	< 0.001
Interpersonal relations and leadership	Predictability	50.0 (37.5-75.0) [ii]	57.7 (20.9)	*0.2414*
	Rewards (recognition)	58.3 (41.7-83.3) [ii]	66.2 (19.9)	*0.4364*
	Role clarity	83.3 (66.7-91.7) [ii]	73.5 (16.4)	< 0.001
	Role conflicts	46.8 (21.4) [i]	42.0 (16.6)	0.002
	Quality of leadership	58.3 (25.4) [i]	55.3 (21.1)	0.069
	Social support from colleagues	66.7 (41.7-83.3) [ii]	57.3 (19.7)	0.001
	Social support from supervisors	75.0 (33.3-91.7) [ii]	61.6 (22.4)	< 0.001
	Social community at work	83.3 (66.7-100.0) [ii]	78.7 (18.9)	0.756
Work-individual interface	Job satisfaction	60.0 (18.6) [i]	65.3 (18.2)	< 0.001
	Work-family conflict	25.0 (16.7-50.0) [ii]	33.5 (24.3)	0.008
Values at the workplace	Mutual trust between employees	51.0 (18.4) [i]	68.6 (16.9)	< 0.001
	Trust regarding management	58.7 (17.8) [i]	67.0 (17.7)	< 0.001
	Justice and respect	50.0 (31.3-68.8) [ii]	59.2 (17.7)	< 0.001
Health and well-being	Self-rated health	50.6 (24.1) [i]	66.0 (20.9)	< 0.001
	Sleeping troubles	36.4 (21.9) [i]	21.3 (19.0)	< 0.001
	Burnout	45.6 (21.1) [i]	34.1 (18.2)	< 0.001
	Stress	38.8 (19.7) [i]	26.7 (17.7)	< 0.001

i. Normally distributed, expressed as mean (+/- SD) and one sample t-test used.

ii. Non-normally distributed, expressed as median (IQR) and Wilcoxon signed-rank test used.

**COPSOQ scales guidance document (appendix 2).*

Table 14: Prevalence of offensive behaviour components

Offensive behaviour component	Study sample	Reference*
Sexual harassment	6.6%	2.9%
Threats of violence	19.9%	7.8%
Physical violence	9.6%	3.9%
Bullying	23.5%	8.3%

*COPSOQ scales guidance document (appendix 2)

4.4.2. Description of *stress* data

The *stress* variable mean for the entire study sample was 38.8 (SD 19.8). Figure 6 shows the distribution of *stress* data, and figure 7 shows the values of *stress* across the different demographic categories. There were relatively small differences in the mean values for *sex* (37.6 for males and 39.5 for females) and *age group* (range: 35.4 to 42.2). However, marked differences were seen with regards to *job category*, with a *stress* mean for 32.2 (SD 15.6) for front line staff, 39.7 (SD 19.4) for back office staff and 51.2 (SD 24.2) for managers.

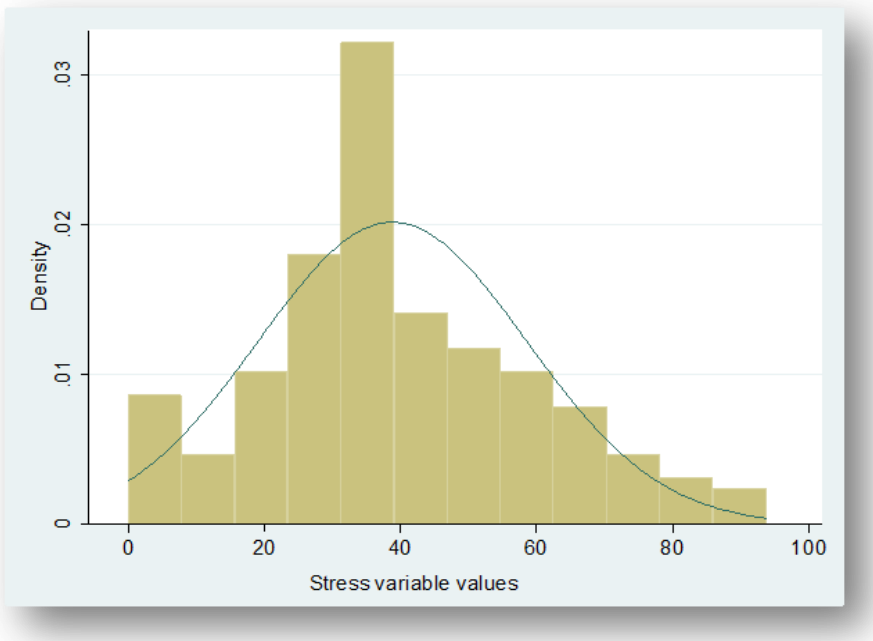


Figure 6: Distribution of *stress* data for study population

In terms of comparisons, 68.1% (n=113) of the study sample had a *stress* value above the reference mean of 26.7. Furthermore, 57.8% (n=96) had values above reference mean plus the MID (that is, above 35.55).

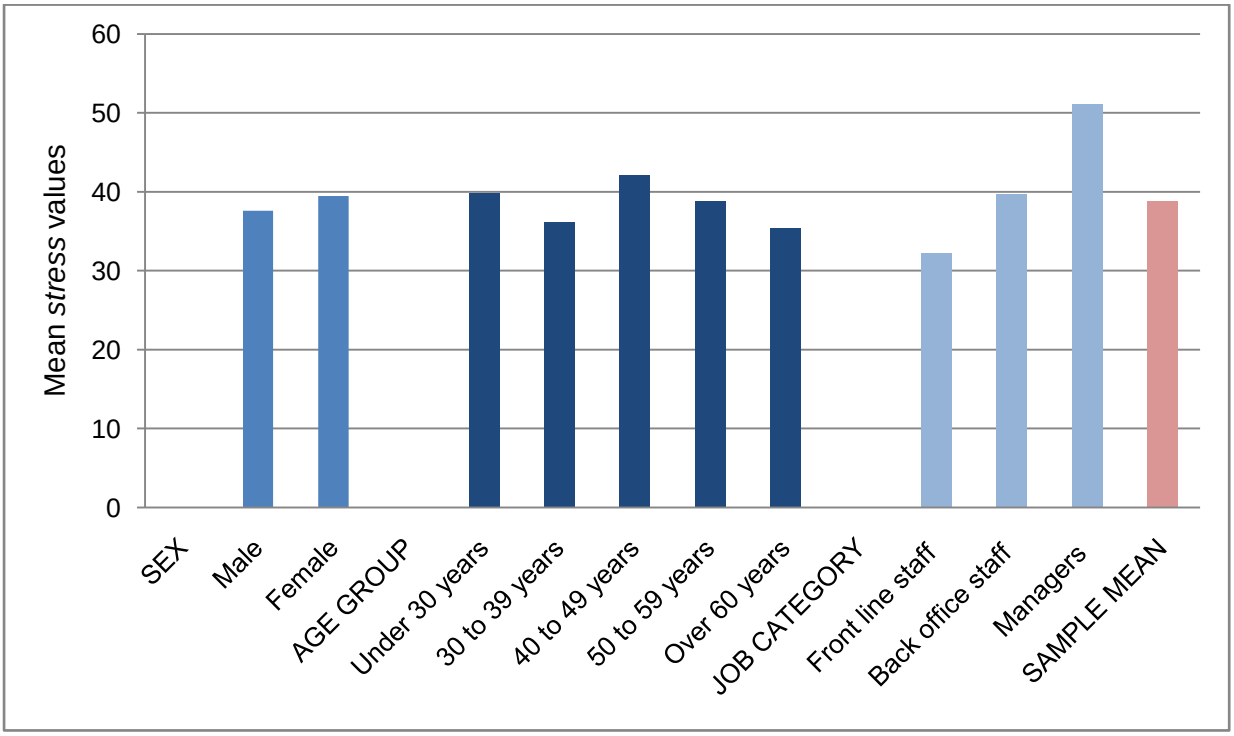


Figure 7: Mean *stress* values according to demographic categories

4.4.3. *Stress* and other outcome variables

A graphical display of the *stress* variable data and those of the other negative outcome variables is in figure 8. Paired t-tests revealed that the difference between *stress* and *burnout* was significant ($p < 0.001$), but that this was not the case for *sleeping troubles* ($p = 0.55$).

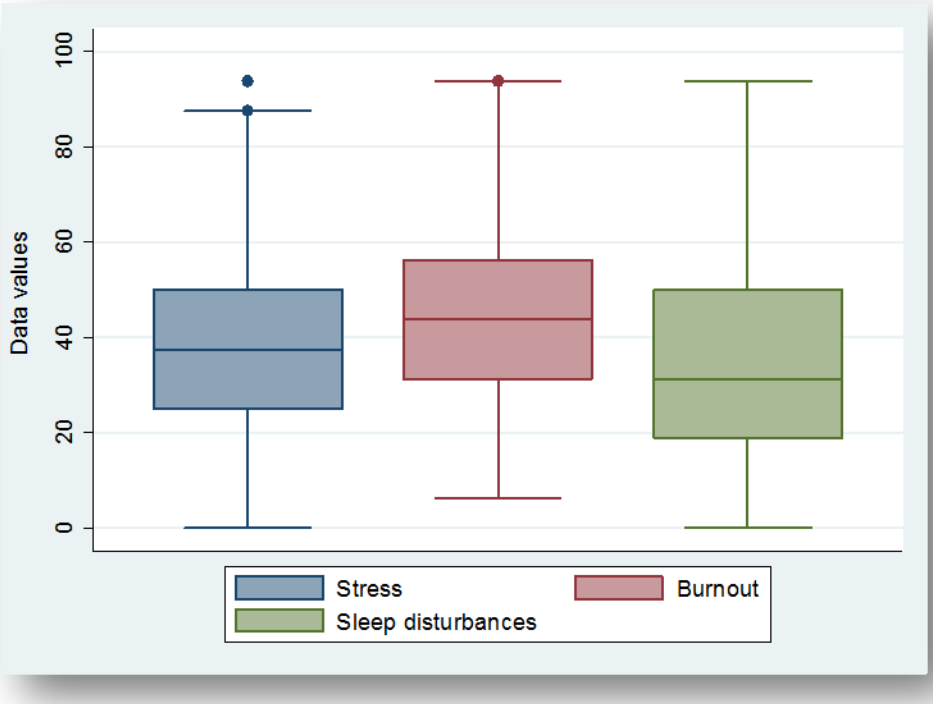


Figure 8: Box plots of outcome variables

Linear relationships between *stress* and the other negative outcome variables are shown in figures 9 and 10. As can be seen, a positive correlation existed between *stress* and *burnout* (r=0.71), and *stress* and *sleeping troubles* (r=0.65). As could be anticipated, *stress* was negatively correlated to *self-rated health* (r= - 0.28).

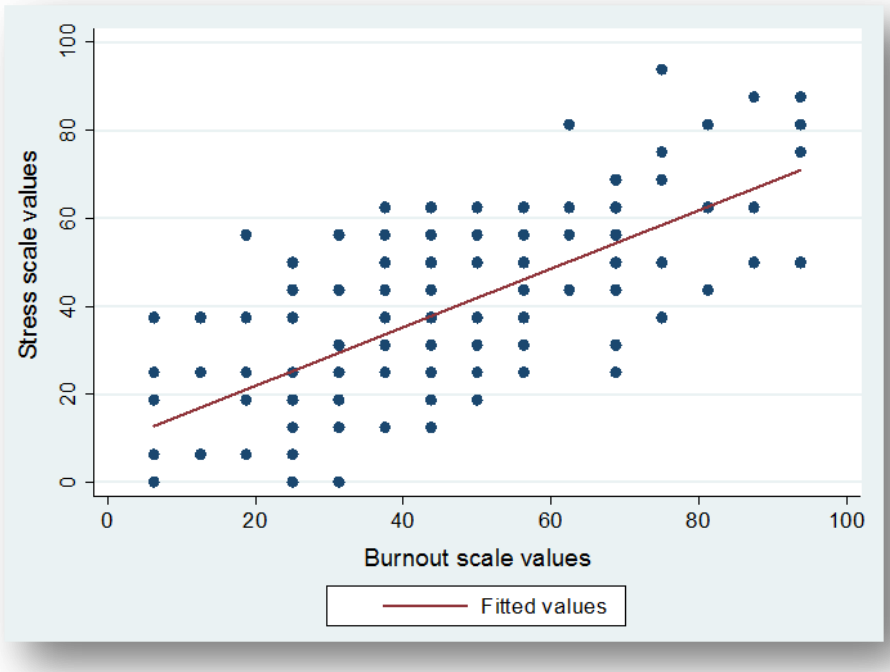


Figure 9: Two way scatter plot of *stress* and *burnout* data

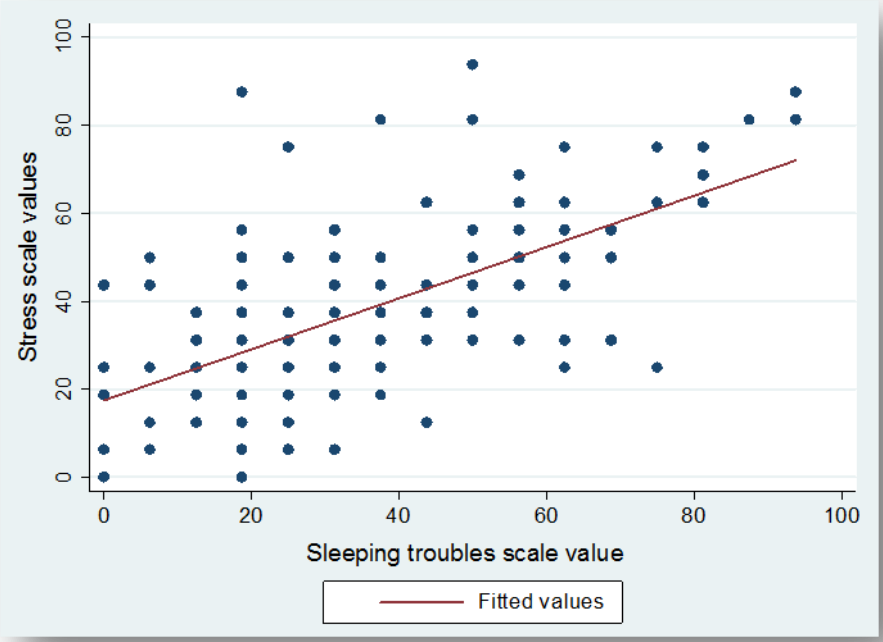


Figure 10: Two way scatter plot of *stress* and *sleeping troubles* data

4.4.4. Analysis of variance in relation to *stress*

Variance in relation to the *stress* variable was not significant for *sex* (p = 0.57) and *age group* (p = 0.65); these two variables were, therefore, excluded as potential confounders. However, ANOVA testing found there to be a statistically significant difference for *job category* (p < 0.001). Further testing found significant differences in the variance of *job category* with the following exposure variables: *quantitative demands* (p = 0.005), *emotional demands* (p < 0.001), *commitment to workplace* (p = 0.006) and *work-family conflict* (p = 0.009). *Job category* was, therefore, included as a potential confounder in multivariate analyses (described in section 4.5)

In order to determine if *job category* was also an effect modifier with regards to *stress*, a test of homogeneity was carried.[75] Specifically the homogeneity of odds was assessed using *job category* and the binary of *stress*. As the *stress* binary used the reference value plus MID as a cut-off, a significant test finding would indicate that

job category had at least a minimally important modifying effect on *stress*. However, as the test found a *p*-value of 0.09, it was concluded that *job category* was not a significant effect modifier with regards to (the MID measure of) *stress*.

4.5. Analysis of risk factors

4.5.1. Test for multicollinearity

Table 15: Results of multicollinearity testing

Exposure variable	**VIF**	$\sqrt{VIF}$
Quantitative demands	1.2	1.1
Work pace	1.3	1.2
Emotional demands	1.3	1.1
Influence	1.2	1.1
Possibilities for development	1.7	1.3
Meaning of work	1.6	1.3
Commitment to workplace	1.7	1.3
Predictability	1.4	1.2
Rewards (recognition)	2.2	1.5
Role clarity	1.4	1.2
Role conflicts	1.4	1.2
Quality of leadership	1.6	1.3
Social support from colleagues	1.5	1.2
Social support from supervisors	1.7	1.3
Social community at work	1.4	1.2
Job satisfaction	1.4	1.2
Work-family conflict	1.3	1.2
Mutal trust between employees	1.2	1.1
Trust regarding management	1.4	1.2
Justice and respect	1.7	1.3
Offensive behaviour	1.4	1.2
Range	*1.2 – 2.2*	*1.1 – 1.5*
Mean	*1.5*	*1.2*

The results of VIF testing are shown in table 15. The level of multicollinearity was deemed to be acceptably low as none of the $\sqrt{VIF}$ values were above 2.[77]

4.5.2. Logistic regression

4.5.2.a. Bivariate analysis

The bivariate logistic regression findings are displayed in table 16. The most harmful associations were seen in exposures to *offensive behaviour* (OR 4.00, 95% CI: 1.97 – 8.13), *work-family conflict* (OR 3.25, 95% CI 1.65 – 6.40) and high *emotional demands* in the workplace (OR 1.58 – 5.78). Variables that were most protective were *social support from supervisors* 0.27 (0.13 – 0.56), *rewards (recognition*) (OR 0.29, 95% CI: 0.15 – 0.55) and the perceived *quality of leadership* of immediate supervisors (OR 0.33, 95% CI: 0.17 – 0.64).

4.5.2.b. Multivariate analysis

The findings of multivariate logistic regression can also be seen in table 16. Along with variables that didn't meet the *p*-value cut-off of $p < 0.2$, *meaning of work* was excluded because of low scale reliability (alpha = 0.39).

Adjusting for *job category*, risks of *stress* in the main multivariate logistic regression model were exposure to any type of *offensive behaviour* (OR 3.38, 95% CI: 1.54 – 7.43) as well as *quantitative demands* (OR 2.83, 95% CI: 1.35 – 5.92) and *emotional*

demands (OR 2.32, 95% CI: 1.08 – 4.96), while the only protective factor was the perceived *quality of leadership* (OR 0.32, 95% CI: 0.15 – 0.67).

Table 16: Findings of the main logistic regression model

Variable	Bivariate Regression			Multivariate Regression*		
	OR	**95% CI: Low to High**	***p*-value**	**OR**	**95% CI: Low to High**	***p*-value**
Quantitative demands	2.83	1.47 - 5.46	0.002	2.83	1.35 - 5.92	0.006
Work pace	0.95	0.51 - 1.77	0.882			
Emotional demands	3.02	1.58 - 5.78	0.001	2.32	1.08 - 4.96	0.030
Influence	0.79	0.43 - 1.48	0.467			
Possibilities for development	0.90	0.48 - 1.70	0.750			
Meaning of work	0.46	0.21 - 0.97	0.041			
Commitment to workplace	0.38	0.19 - 0.76	0.006			
Predictability	0.55	0.30 - 1.03	0.061			
Rewards (recognition)	0.29	0.15 - 0.55	< 0.001			
Role clarity	0.61	0.31 - 1.22	0.163			
Role conflicts	2.05	1.07 - 3.89	0.029			
Quality of leadership	0.33	0.17 - 0.64	0.001	0.32	0.15 - 0.67	0.002
Social support from colleagues	0.38	0.19 - 0.75	0.005			
Social support from supervisors	0.27	0.13 - 0.56	< 0.001			
Social community at work	0.46	0.24 - 0.86	0.016			
Job satisfaction	0.38	0.20 - 0.72	0.003			
Work-family conflict	3.25	1.65 - 6.40	0.001			
Mutual trust between employees	0.47	0.20 - 1.11	0.085			
Trust regarding management	0.35	0.18 - 0.68	0.002			
Justice and respect	0.53	0.27 - 1.01	0.054			
Offensive behaviour	4.00	1.97 - 8.13	< 0.001	3.38	1.54 - 7.43	0.002

* Adjusted for *job category.*

In addition to the main logistic regression model, further analysis showed differences by *sex*, as detailed in table 17. Again adjusting for *job category*, the greatest risk factor of *stress* for females was *work-family conflict* (OR 4.03; 95% CI: 1.45 - 11.21) while the most protective factor was *social support from supervisors* (OR 0.28; 95% CI: 0.08 - 0.93). For males, exposure to *offensive behaviour* was a significant risk factor (OR 4.63; 95% CI: 1.15 - 18.63), while the *social community at work* was protective (OR 0.18; 95 CI: 0.05 - 0.67).

Table 17: Further multivariate logistic regression, by *sex*.

Variable	Females*			Males*		
	OR	**95% CI: Low to High**	***p*-value**	**OR**	**95% CI: Low to High**	***p*-value**
Emotional demands	3.61	1.26 - 10.36	0.017			
Rewards (recognition)	0.30	0.10 - 0.89	0.030			
Social support from supervisors	0.28	0.08 - 0.93	0.038			
Social community at work				0.18	0.05 - 0.67	0.010
Work-family conflict	4.03	1.45 - 11.21	0.008			
Offensive behaviour				4.63	1.15 - 18.63	0.031

* Adjusted for *job category*

4.5.2.c. Goodness-of-fit of the model

Post-estimation application of the Hosmer and Lemeshow's goodness of fit test found a *p*-value of 0.57, indicating that the main multivariate logistic regression model fit the data at a level that was acceptable (as the was *p*-value was $\geq$ 0.05) .[65]

4.5.2.d. Predictive performance of the model

The result of the ROC curve analysis – which describes the main multivariate logistic regression model's ability to predict *stress* – is shown in figure 11. The area under the ROC curve was 0.79 (95% CI 0.72 – 0.86). The curve was, thus, considered to be significant as the area under it did not cross 0.5.[65]

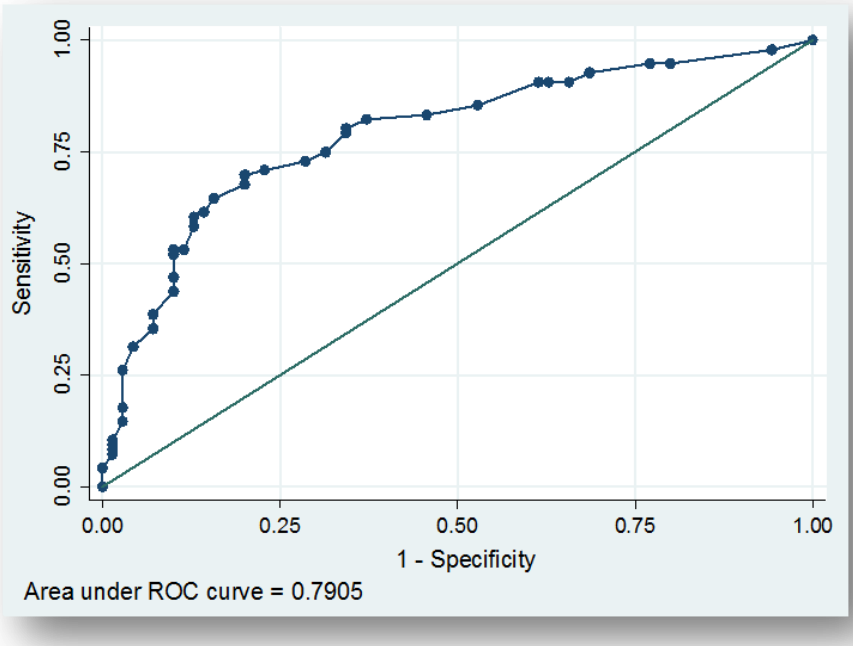


Figure 11: ROC curve analysis of main multivariate logistic regression model

4.5.3 Ordinal logistic regression

4.5.3.a. Bivariate analysis (ordinal)

The dependent ordinal variable of *stress* incorporated *no stress* (n=70), *low stress* (n=50) and *high stress* (n=39). Bivariate analysis showed that the harmful exposures identified in ordinal regression were similar to those detected in the main bivariate logistic regression model (as seen in table 18). Protective exposures were also

comparable, with the addition of *commitment to workplace* (OR 0.42, 95% CI: 0.23 – 0.76).

Table 18: Findings of the ordinal logistic regression model

Variable	Bivariate Regression			Multivariate Regression*		
	OR	**95% CI: Low to High**	***p*-value**	**OR**	**95% CI: Low to High**	***p*-value**
Quantitative demands	2.64	1.47- 1.47	0.001	2.38	1.27 - 4.46	0.007
Work pace	1.13	0.64 - 1.98	0.681			
Emotional demands	2.85	1.55 - 5.27	0.001			
Influence	0.77	0.44 - 1.35	0.359			
Possibilities for development	0.94	0.53 - 1.67	0.828			
Meaning of work	0.48	0.25 - 0.92	0.026			
Commitment to workplace	0.42	0.23 - 0.76	0.004	0.46	0.24 - 0.86	0.014
Predictability	0.59	0.33 - 1.05	0.073			
Rewards (recognition)	0.31	0.17 - 0.56	< 0.001			
Role clarity	0.69	0.37 - 1.27	0.231			
Role conflicts	2.44	1.33 - 4.46	0.004			
Quality of leadership	0.42	0.24 - 0.75	0.004			
Social support from colleagues	0.46	0.25 - 0.83	0.009			
Social support from supervisors	0.37	0.20 - 0.67	0.001			
Social community at work	0.47	0.27 - 0.84	0.010			
Job satisfaction	0.43	0.24 - 0.76	0.004			
Work-family conflict	3.25	1.78 - 5.91	< 0.001			
Mutual trust between employees	0.63	0.27 - 1.46	0.283			
Trust regarding management	0.42	0.23 - 0.79	0.007			
Justice and respect	0.53	0.28 - 0.97	0.040			
Offensive behaviour	3.88	2.10 - 7.17	< 0.001	3.60	1.92 - 6.75	< 0.001

* Adjusted for *job category.*

4.5.3.b. Multivariate analysis (ordinal)

The results of ordinal multivariate regression modelling indicated that employees with *low stress* were at risk of developing *high stress* if there was exposure to *offensive behaviour* (OR 3.60; 95% CI: 1.92 - 6.75) or high *quantitative demands* (OR: 2.38; 95% CI: 1.27 - 4.46). Conversely, this transition could be prevented by a *commitment to workplace* (OR 0.46; 95% CI: 0.24 - 0.86).

4.6. Summary of results

This chapter has reported on the salient findings of the study. After a brief description of the study sample, the results of the reliability testing were presented. It was found that only two (out of 24 scales tested) fell below the unacceptability alpha threshold. In terms of variable analysis, it was demonstrated that almost all exposure and outcome variables (including *stress*) were statistically significantly different from the reference values. *Stress* was also correlated with the other outcome variables (positively with *burnout* and *sleeping troubles*, and negatively with *self-rated health*). Finally, a significant variation of *job category* was found in relation to *stress* and a number of the exposure variables - *job category* was, ultimately, adjusted for as a potential confounding factor.

The main multivariate logistic regression model found three significant risk factors (exposure to *offensive behaviour, quantitative demands* and *emotional demands*) but only one significant protective factor (*quality of leadership*). Further analysis found differences in risk factors with regards to *sex*, with *work-family conflic*t being most

harmful for females, while *support from supervisors* was the most protective. For males, exposure to *offensive behaviour was* a significant risk factor, whereas the *social community at work* was protective. Finally, ordinal regression demonstrated that further exposure to *offensive behaviour* and *quantitative demands* were risks for moving employees from a *low stress* to *high stress*, but that a *commitment to work place* could help to prevent this escalation.

CHAPTER FIVE

5. Discussion

5.1. Chapter overview

This chapter will provide a discussion of the key research findings. Issues related to the reliability of the COPSOQ within the study setting will be explored, with an emphasis on possible reasons for (and potential ways of improving) the lower Cronbach's alpha values. The prevalence measurement findings will then be examined and this, together with a discussion of the risk factor analysis, will allow for a consideration of the implications of the study findings. Finally, a delineation of study limitations will be undertaken.

5.2. Reliability testing

5.2.1. Cronbach's alpha values

Although the majority of the scales were above the unacceptability threshold of 0.5, only 37.5% were within the categories 'acceptable' or 'good.' The study sample's alpha range (0.31 to 0.85) may be cause for concern, especially given the relatively high Cronbach's values reported in the COPSOQ scales guidance document (alpha range: 0.67 to 0.89, as detailed in appendix 2). Furthermore, a number studies in other countries have found the levels of reliability of the questionnaire to be acceptable; Moncada et al. showed that the reliability of scales for a Spanish version

of the COPSOQ ranged from 0.59 to 0.90, and Dupret's assessment of a French version questionnaire (using measures that included the internal consistency of the scales) found the results to be satisfactory, with an alpha range of 0.54 to 0.87.[49,51]

There has, however, been a recognition that not all of the scales necessarily meet the internal consistency assumption (that is, the assumption that items on a scale only measure one, uni-dimensional construct).[48] While aspects of the assumption itself have been questioned (Yu, for example, has argued that internal consistency does not necessarily entail uni-dimensality[87]) it has, nonetheless, been used as a guide for subjecting scales to the Cronbach's alpha statistic.[48]

In light of this, Thorsen and Bjorner identified only eight COPSOQ scales for which, they believed, the internal consistency assumption held. These are: *work pace*, *meaning of work, commitment to the workplace, role clarity, work-family conflict, sleeping troubles, burnout* and *stress*.[48] Table 19 shows a comparison of the Cronbach's alpha values for these scales. As is demonstrated, the study sample's COPSOQ scales (with the exception of *meaning of work*) are above the acceptability threshold of 0.5, and several have alpha values that are similar to the other studies.

There are, of course, a number of other possible explanations for the low alpha values in the some of the scales. Reasons could relate to the configuration of the questionnaire. Tavakol and Dennick, for example, cite a paucity of, or poor inter-relatedness between, items as well as diversity within constructs as being possible factors to consider in cases of low reliability.[72]

Table 19: Comparison of scales that meet the internal consistency assumption

Exposure variable	Alpha values		
	Thorsen and Bjorner[48]	Dupret et al.[49]	Study values
Work pace	0.85	0.69	0.68
Meaning of work	0.68	0.80	0.39
Commitment to the workplace	0.75	N/A	0.65
Role clarity	0.77	0.87	0.58
Work-family conflict	0.80	0.82	0.71
Sleeping troubles	0.84	N/A	0.82
Burnout	0.81	0.76	0.83
Stress	0.85	0.71	0.80

5.2.2. Potential improvement of scale reliability

In terms of enhancing reliability, the individual scales themselves could be re-designed. A possible approach for this could be to adjust or re-configure the scales using factor analysis. Factor analysis is a technique of reducing data that involves the identification of latent variables (which can be described as underlying 'factors').[88–90]

Using the factor analysis guidelines developed Torres-Reyna,[89] the two unacceptably unreliable scales of *possibilities for development* and *meaning of work* can be combined into one scale and assessed, as is shown table 20 (details of the items listed can be found in appendix 2). By rotating the data and removing the variable that is the least relevant to factor 1 (that is the *take initiative* item) a new six-item scale can be formed. On testing, this new scale (which could perhaps be called *development and meaning at work*) has a Cronbach's alpha value of 0.64, which is

not only higher than either of the original scales but is also well within the threshold of acceptable reliability used in this study.

There are, certainly, a number of problems with this approach. Firstly, although these items are all related to the same underlying factor, they, together, represent an entirely new scale. This, of course, raises questions with regards to (testing) the scale's validity - in fact, it is for this reason that the new scale was not used in this study. Secondly, factor analysis aims at reducing the number of items, thereby making the data more manageable.[90] In this instance, the items are actually increased and result in a more complex scale.

Table 20: Rotated factor loadings

Item name (item number)	Factor 1	Factor 2	Factor3
Take initiative (35.4)	-0.03	0.03	0.25
Possibility of learning (35.31)	0.62	0.18	0.02
Use skills (35.20)	0.29	0.12	0.36
Develop skills (35.36)	0.33	0.40	-0.03
Meaningful work (35.5)	0.21	0.40	0.23
Important work (35.13)	0.21	0.36	0.07
Motivated in work (35.52)	0.65	0.09	0.10

The above notwithstanding, using data from the study sample, a more reliable scale was produced. Furthermore, the scale contains items that all belong to the 'work organisation and job contents' group, as defined by Thorsen and Bjorner.[48] Factor analysis could, therefore, be a possible way of improving the questionnaire for future use within the local context.

5.3. Prevalence measurement

5.3.1. Managers as a vulnerable group

It is noteworthy that the study sample's *stress* mean value of 38.8 (SD 19.7) was higher than the reference value plus the MID (that is > 35.55). Although this high value needs to be interpreted with caution (as discussed in section 5.6.3), it does make the identification of particularly vulnerable groups an imperative.

ANOVA testing in relation to *stress* had found a significant variation in *job category*, with the highest mean value of *stress,* 51.2 (SD 24.2), being seen in the managers category. Managers may, therefore, represent a group that warrants special attention.

The pattern of a higher *stress* level amongst managers as compared to other categories of staff was not immediately apparent in the literature. For example, Caplan undertook a study in the United Kingdom's National Health Service (NHS) which examined anxiety, depression and stress as experienced by general practitioners, consultants and hospital managers and demonstrated that there was no significant difference between these groups in relation to the anxiety component of the measurement scale used.[91] Furthermore, a comparative analysis of female managers and female clerical workers in a Canadian setting found that there was, in fact, a higher level of distress and poorer coping strategies amongst the clerical workers.[63] A study undertaken by Turnage and Spielberger of managers (n=68), professionals (n=171) and clerical workers (n=69) in a manufacturing firm found that

the managers experienced job pressures more frequently than the professionals; however, less intensity was attributed to these pressures by this group.[62]

This raises important questions with regards to the managers group in the study. Indeed, the question of why *stress* in this group was so markedly higher than the rest of the study sample cannot be easily answered by referring to the evidence base. In terms of a possible further investigations, conducting in-depth interviews directly with managers would provide for qualitative data collection and analysis,[92] which, in turn, could shed light on the underlying factors at play here.

In terms of risk and protective factors that are particular to managers, a number of studies provide salient information. Manshor et al., undertook a study of managers (n=440) in Malaysia and found that high workloads and poor relationships in the workplace were among the variables that were positively correlated with stress.[93] A large study of divisional/sectional managers (n=3870) and foreman (n=2666) in a Japanese setting found that long working hours (≥ 10 hours) was significantly associated with perceived stress for both groups.[94] Finally, a study of managers in a restaurant chain in the United States found positive correlations between job stress (anxiety) and conflict in job role, number of hours worked in a week and the sense that management, at the corporate level, was “out of touch.” Negative correlations were, however, found with job stability and opportunities for career development.[95] All of these factors would be important to consider when designing interventions bespoke to the managers group in the target population.

5.3.2. Relationship with other outcomes

5.3.2.a. Burnout

The study showed a strong correlation between *stress* and *burnout* (r=0.71). A number of potential risk factors could be considered here. Gillespie and Cohen, for example, have described perceived causes of employee burnout in terms of three, inter-related categories, namely: work/responsibility overload, insufficient recognition and difficulties in communication (with, for example, supervisors).[96]

With regards to protective variables, a factor that is of relevance to *burnout* is the development of coping strategies. With reference to athlete burnout, Raedeke and Smith discuss two categories of coping resources that may have a moderating effect on the relationship between stress and burnout, namely internal resources/coping behaviours and external resources/social support.[97]

While the study sample showed relatively high median values of social support from both colleagues (66.7; IQR: 41.7 - 83.3) and supervisors (75.0; IQR: 33.3 - 91.7), there was no scale that directly measured individual coping behaviour. Further investigation into such behaviour may need to be undertaken (using relevant tools such as the Response to Stress Questionnaire[98] or the Coping Strategies Inventory[99]). This could provide evidence for the development of specific coping interventions to complement existing social support resources.

5.3.2.b. Sleeping troubles

Stress was also positively correlated with *sleeping troubles* (r=0.65). Of relevance to this finding, a large study (n=5720) undertaken in Stockholm found that 'disturbed sleep' was associated with the stressors of 'high work demands' (OR 2.15; 95% CI: 1.29 – 3.58) and 'high physical load' (OR 1.94; 95% CI: 1.30 – 2.88) as well as the protective factor of 'high social support' (OR 0.44; 95% CI: 0.27–0.72).[37] Furthermore, Fahlén et al. showed that an effort-reward imbalance at work had significantly adverse consequences in terms of sleep disturbances.[100] With respect to this, efforts to mitigate *quantitative demands* (as will be discussed in section 5.4.1) and to enhance the social support experienced by employees in the target population would be pertinent. Furthermore, attention would also need to be paid to the provision *rewards (recognition)* so as to maintain an effort-reward balance.

In view of the points that have been raised above, table 21 is an attempt to match some of the variables to possible interventions aimed at preventing stress in managers, as well as reducing burnout and sleeping troubles related to stress.

Table 21: Variables that may require special emphases for certain groups

Exposure variable	Managers	Employees with burnout or sleeping troubles
Quantitative demands	X	X
Possibilities for development	X	
Rewards (recognition)		X
Role conflicts	X	
Social support from colleagues		X
Social support from supervisors		X
Social community at work	X	

5.4. Analysis of risk factors

Before considering the determinants of stress, it is appropriate to briefly return to the *a priori* argument raised in section 3.9.6., namely that significant association(s) would have to be shown between stress and the exposure variable(s) before it could be called a work-related outcome. As multivariate logistic regression modelling has demonstrated such associations, the variable *stress* will be used inter-changeably with 'occupational stress' for the rest of the study.

Figure 12 shows the scale of significant exposures that were identified in this study, from most harmful to most protective.

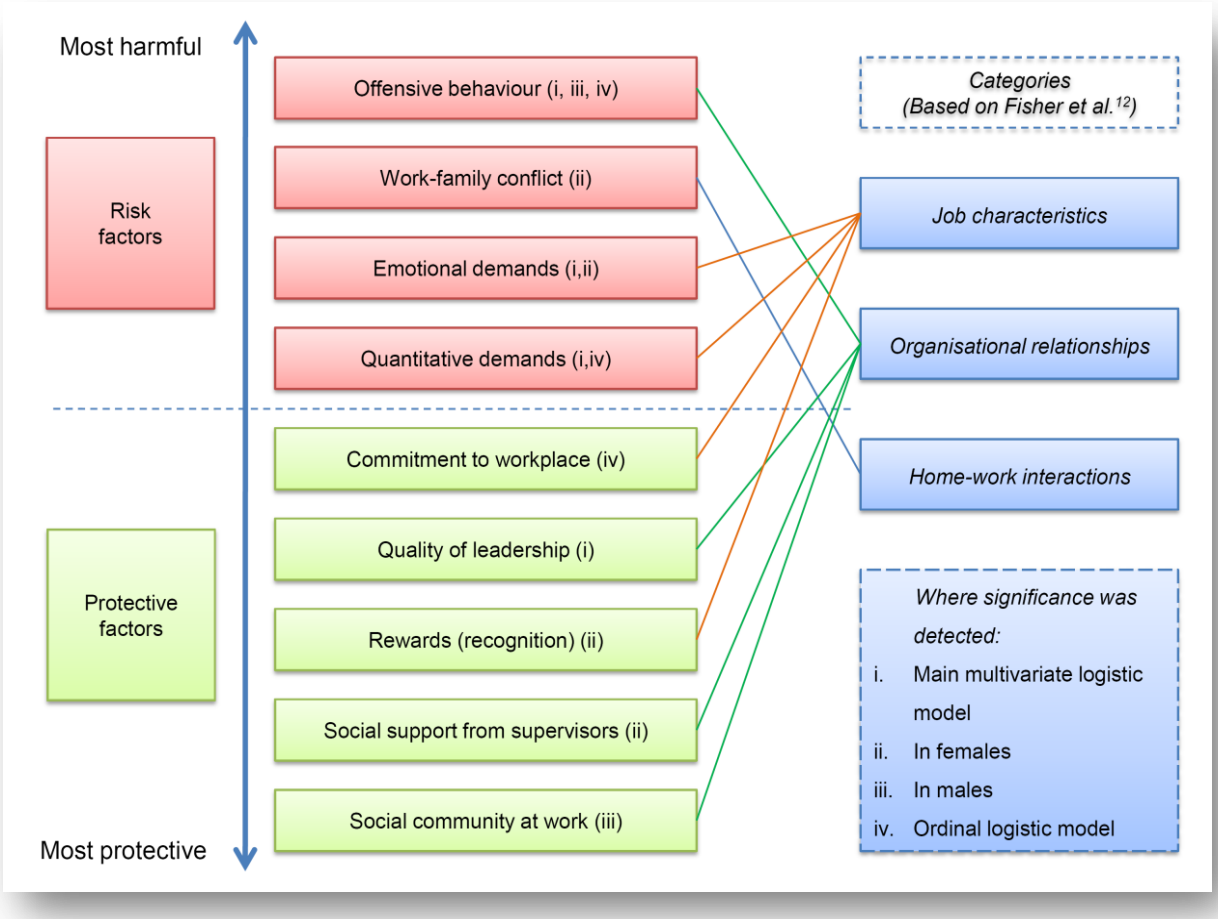


Figure 12: Significant exposures related to occupational stress

Furthermore, with reference to the categories of stressors identified by Fisher et al, these exposures can be grouped into: (1) job characteristics; (2) work relationships and (3) home-work interface – this is also included in figure 12. Each of these exposures will now be considered in turn.

5.4.1. Risk factors related to job characteristics

5.4.1.a. Emotional demands

Emotional demands were associated with occupational stress in the main logistic model (OR 2.32; 95% CI: 1.08 – 4.96, $p < 0.05$) and in females (OR 3.61; 95% CI: 1.26 – 10.36, $p < 0.05$). *Emotional demands* have been identified as an integral part of the *demands* component in the 'job demands-resources model.'[101,102] Specifically, it has been postulated that job resources "buffer" the effects of job demands on the strain experienced in the workplace (as discussed by Bakker and Demerouti).[102(p.314)] The manifestation of stress may therefore occur when (emotional) demands exceed the available job resources.

In order to address stress, then, it is important to ensure that there are sufficient job resources available. In terms of identifying specific types of resources, Bakker et al. have described the following: social support in the workplace, coaching by supervisors, the provision of feedback with regards to job performance and the ability of employees to control their time.[101] Given the high levels of risk detected, it would be important that more of these resources be made available to the administrative staff at CHBAH.

5.4.1.b. Quantitative demands

Quantitative demands were significant in both the main (OR= 2.83; 95% CI: 1.35 – 5.92, $p < 0.01$) and ordinal (OR = 2.38; 95% CI: 1.27 – 4.46, $p < 0.05$) regression models. Q*uantitative demands* have been placed alongside *emotional demands* in the 'job resources-demands model' (with the need for sufficient job resources again being of pertinence).[101]

Another important consideration here is the relationship between workplace demands and job control. Germane to this is Karasek's 'demands-control model,' which hypothesizes that high job strain will occur when there are high job demands but low job control (where job control refers to the employee's autonomy with regards to work tasks as well as their ability to control which skills they use).[103,104] In terms of related research, Dwyer and Ganster undertook a study of employees in the manufacturing industry (n=90) and found that job demands (which included a measure of quantitative workload) were associated with sickness absence and tardiness only when job control was perceived to be low.[105] A more detailed exploration of the interplay between *job control*, *quantitative demands* and occupational stress in the target population may, therefore, be warranted (for the purposes of both further analysis and intervention design).

5.4.1.c. Commitment to the workplace

Commitment to workplace was found to be a significant in terms of preventing the transition from *low stress* to *high stress*, as demonstrated in the ordinal regression

(OR 0.46; 95% CI: 0.24 – 0.86; $p <$ 0.05). Similar relationships have been found in other studies. A study in the United Kingdom involving a sample of teachers (n=95) found an inverse relationship between occupational commitment and perceived stress.[106] Furthermore, a Hong Kong-based study using data from two samples of employees (n=386 and n=145) found that, in the first sample, organisational commitment protected the employees against the adverse effects of stress and also moderated the relationship between stress and job performance.[107]

In terms of evidence for developing interventions, the role of emotional intelligence (EI) may need to be explored. Indeed, a study by Nikolaou and Tsoausis involving professionals employed in mental health institutions (n=212) found that overall EI (as measured by relevant instruments) was positively correlated with the employees' commitment to the organization (r=0.53), and that the high EI group had a significantly lower job stress index mean than the low EI group.[108] Exploring the relatively novel area of EI interventions may, therefore, be of benefit in terms of improving *commitment to workplace.*

5.4.1.d. Rewards (recognition)

Rewards (recognition) was identified as a significant protective factor in females (OR 0.30; 95% CI: 0.10 – 0.89, $p < 0.05$). Here the relationship between effort and reward in the workplace (mentioned in section 5.3.2.b) is of relevance. With regards to this, Siegrist has forwarded an 'effort-reward imbalance' model in which high costs with a low gains in the workplace result in chronic stress which, in turn, contributes to poor health outcomes (particularly cardiovascular disease).[109] This model has

considerable empirical support; indeed, a review of 45 studies by van Vegchel et al. found substantial evidence to support the hypothesis that high efforts in combination with low rewards increased health risks.[110]

In order to reduce occupational stress in the target population, then, it would be important to actively maintain a balance between efforts and rewards. In terms of the actual types of rewards that can be explored, Siegrist et al. has identified the following three categories: financial rewards, 'esteem awards' (such as respect and recognition from supervisors and colleagues for work done) and career-development awards (such as promotions).[111]

5.4.2. Risk factors related to organisational relationships

5.4.2.a. Offensive behaviour

Exposure to *offensive behaviour* was shown to be a significant risk for *stress* in the main (OR 3.38; 95% CI: 1.54 – 7.43, $p < 0.01$) and ordinal (OR 3.60; 95% CI: 1.92 – 6.75, $p < 0.001$) logistic regression models, and in males (OR 4.63; 95% CI: 1.15 – 18.63, $p < 0.05$). The components of *sexual harassment*, *physical violence*, *threats of violence* and *bullying* will each be considered in turn.

The prevalence of *sexual harassment* was more than double that of the reference prevalence value (6.6% compared to 2.9%). The consequences of this type of *offensive behaviour* are myriad and severe. These include symptoms related to post-traumatic stress, a decline in work productivity and diminished self-confidence.[112,113]

For example, a study undertaken by Schneider et al. included a sample of female university employees (n=300) and found, within this group, positive partial correlations between sexual harassment and withdrawal from work (0.19) and PTSD symptoms (0.19), as well as a partial negative correlation with a 'Satisfaction With Life' scale (-0.20), all at the $p < 0.01$ level of confidence.[112] Efforts to address this form of *offensive behaviour* should include the development of anti-harassment policies, clear grievance procedures and appropriate support services for victims.[114]

There were also relatively high levels of *threats of violence* (19.9%) and actual workplace *physical violence* (9.6%). In addition to the obvious risk of physical injury, such violence can produce adverse psychological/emotional outcomes which may, in severe cases, result in post-traumatic stress disorder (PTSD).[115,116] However, it should be noted that the psychological/emotional impact on the victim of physical violence may not necessarily relate to the severity of the exposure.[115] Therefore, every case of physical violence in the target workplace, no matter what the perceived seriousness, would need to be carefully addressed.

Finally, almost a quarter of employees in the study sample reported being bullied in the last year. Although this is alarmingly high (the reference prevalence for *bullying* was 8.3%) other studies have shown similar levels of this *offensive behaviour*. A study based in a community NHS trust, for example, found that 38% of the participants had experienced bullying in the last year, and that bullied staff had higher levels of work-related stress (as well as anxiety and depression) and a greater intention to leave their jobs.[117] Furthermore, a Finnish study involving municipal workers found bullying to be experienced by 10% of the participants. The study also

found those participants who had been exposed to bullying (either directly or observed) had significantly higher levels of general stress and greater usage of sleep-inducing medication.[118]

5.4.2.b Quality of leadership

The *quality of leadership* was significantly protective in the main logistic model (OR 0.32; 95% CI: 0.15 – 0.67*, p* < 0.01). In terms of leadership style, the possible relationships between abusive and passive (such as *laissez-faire*) leadership and increased occupational stress has been described.[119] Conversely, a study undertaken by Kelloway and McKee indicated that transformational leadership (which consists of "idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration") was associated with the psychological well-being of employees.[120 (p.193)]

Caution will be need in addressing *quality of leadership* in the target population. A focus only on the negative components of leadership may be interpreted as being accusatory; this may, in turn, alienate staff in key roles. Given the vital role that support from managers has in introducing occupational stress interventions,[54] careful planning and sensitivity will be required here.

5.4.2.c. Social support from supervisors

Social support from supervisors was a significantly protective factor in females (OR 0.28; 95% CI: 0.08 – 0.93; *p* < 0.05). Such support is, of course, closely related to

the *quality of leadership*. Indeed, Offermann and Hellmann found that emotional supportive behaviours of leaders (such as approachability, developing trust and showing interest in employee growth) were significantly negatively correlated with employee stress.[121]

It has also been postulated that social support helps to protect individuals from the adverse health outcomes of stressful life events (the so-called "buffer effect").[122,123] More specifically, in a study undertaken by Beehr et al. involving registered nurses (n=225) it was found that social support from supervisors (especially communication not related to the job) acted as a moderator, or buffer, in terms of the occupational stressor-strain relationship.[124] The appropriate training of supervisors with regards to supportive behaviour and communication may, therefore, be of value.

5.4.2.d. Social community at work

The *social community at work* was found to be protective against occupational stress in males (OR 0.18; 95% CI: 0.05 – 0.67; $p < 0.05$). Studies have explored the relationship between collegiality and (the reduction of) stress. A perceived lack of collegial support has, for example, been associated with stress in teachers[125] and nurses.[126] More broadly, integration into social networks has been shown to have an overall beneficial effect on employee health, regardless of whether or not stress is being experienced.[122]

From the individual perspective, an 'integrative' personal style of conflict resolution (as opposed to an approach that is either dominating or avoiding) has been shown to

improve relationships at work, which, in turn, reduces stress.[127] Finally, at a collective level, Cropanzano et al. found that organisational politics (characterized by the formation of competitive groups in the workplace) and organisational support were positively and negatively correlated with stress variables, respectively.[128] Interventions in the target population could thus focus on encouraging collegial support and social integration, educating employees on constructive conflict resolution styles, and fostering a more supportive environment in the workplace.

5.4.3. Risk factors related to home-work interactions

5.4.3.a. Work-family conflict

The impact of *work-family conflict* was shown to be significant in females (OR 4.03; 1.45 – 11.21, $p < 0.01$). Byron has grouped variables that directly impact on the work-family interface into those that relate to the workplace (such as hours at, and flexibility of, work) and those that relate to the individual (such as coping skills).[129]

According to Allen et al., once *work-family* conflict has been experienced, its corollaries can be categorized into work-related (such as absenteeism and poor job performance), non-work related (such as a lack of 'life satisfaction') and specifically stress-related (including somatic and psychological symptoms).[130] Introducing measures that mitigate work-family strain (such as introducing flexible working schedules[129]) could, therefore, be important in the target population.

5.5. Contextual factors

Before moving on to the study's limitations, two important contextual factors need to be briefly discussed, namely the resource restraints in the study setting, and the effects of HIV/AIDS.

5.5.1. Resource constraints

As has already been discussed in section 1.1, occupational stress poses a substantial economic burden. This effect may be felt particularly acutely in public sector hospitals such as CHBAH, where resource constraints are often experienced.[131] An evaluation of the impact that occupational stress has on the resources of the institution (in the form of, for example, a costing analysis of absenteeism related to occupational stress) could provide for a valuable complementary study.

5.5.2. HIV/AIDS

The high prevalence of people living with HIV/AIDS in South Africa has had a substantial and sustained impact on health service delivery.[132] This has had implications for the occupational stress experienced by workers within the health system. Van Dyk, for example, carried out a study amongst caregivers involved in HIV/AIDS services, and found that they viewed their work to be highly stressful (due to factors such as an overload of bereavement).[133]

While staff in the study sample were not involved in the direct care of people living with HIV/AIDS, it is very likely that they interacted with these patients while carrying out their administrative duties (especially those in the front line category). An examination of the possible contribution that this has made to the occupational stress experienced by the staff could potentially provide for important additional insights.

5.6. Limitations

5.6.1. Response rate

The response rate of 47.3% was less than optimal. Although the study power and margin of error were still maintained at acceptable levels (as discussed in section 3.7), a higher response rate would have been desirable. Moreover, this exposed the study to possible volunteer bias[134] in that those who participated may have done so because of a higher level of perceived stress. This could have potentially resulted in a *stress* mean that was above the value that actually existed in the target population.

Efforts were made to engage with selected staff (such as recruiting more fieldworkers) which did improve questionnaire response rate. However, the overall response rate could have been even higher had there been an earlier engagement with the institution's management. Indeed, assistance from management in the latter stages of the fieldwork process resulted in the arrangement of special meetings with selected staff; these meetings, in turn, dramatically improved the response rate.

5.6.2. Need for COPSOQ adaptation

The fact that the English-version of the COPSOQ was used 'as is' in the study was also a considerable limitation. It is important to highlight that the testing of the COPSOQ by both Dupret et al. (in France) and Moncada (in Spain) involved adaption to the local context. In the case of the latter, this involved adjustments for " … the labor market, cultural, and linguistic setting of Spain." [51 (p. 98)]

The COPSOQ was not translated into multiple languages in this study because of resource constraints as well as the assumption (based on discussions with the human resources department) that the selected participants would have an appropriate level of English literacy. Nonetheless, a lack of such adaptation may have impeded the interpretation of questions and, consequently, affected the reliability of scales.

5.6.3. Likert scale interpretation

Likert scales use ordinal data in which individual items have a rank order.[135] However, the presumption that such items can also be measured on an interval scale (that is, with equal values assumed to be between each item) has been strongly challenged as there may differential levels of intensity between these items.[135,136] Nonetheless, given that the COPSOQ scales guidance document gave clear guidelines on an interval approach to calculating the averages (appendix 2), this method was used in the study. Indeed, an alternative approach would have

distorted the reference values, and made it difficult to compare the findings with other studies.

5.6.4. Reliability testing technique

Furthermore, the choice of the reliability testing could also be questioned. While the Cronbach's alpha has been widely used, alternatives could be considered. Specifically, Thorsen and Bjorner found that the test-retest design was more appropriate for testing the reliability of the COPSOQ.[48] This was because it potentially reduced the error due to transient factors (such as the disposition of the participant on the particular day of testing).[48] Also this wasn't carried out due to the challenges around recruiting participants, as reflected in the low response rate, employing such a test-retest study design could have, nonetheless, resulted in more robust reliability testing.

5.6.5. Lack of baseline data

There was no setting-specific baseline data for this study. As a consequence, reference values had to be imported from the COPSOQ scales guidance document (appendix 2). As these values are based on a sample from considerably different context (the workplace dynamics in the Danish context, for example, are likely to be dissimilar to those in the South African setting) this was a research limitation. While the use of the MID addition was made in an attempt to mitigate this, it certainly conceded that the availability of local baseline data would have made for more robust results.

CHAPTER SIX

6. Conclusions and recommendations

6.1. Chapter overview

This final chapter will begin with a summary of the occupational stress study, which will be followed by a brief discussion around the issue of its generalizability. In light of the evidence that has been presented, a description of key recommendations will be made - it is hoped that these recommendations can form the basis for future strategies aimed at measurably reducing stress in workplaces. The chapter, and the dissertation, will then close with a few concluding thoughts.

6.2. Study summary

This study has focused on stress experienced in the workplace. Specifically, it has tested the reliability of an established occupational stress instrument (the COPSOQ) within a South African workface setting; measured the prevalence of stress in that setting and described risk (and protective) factors in the workplace that could be associated with stress.

In terms of reliability, the Cronbach's alpha statistic was used to test the internal consistency of the COPSOQ scales. The result was a wide range of alpha values, with the majority falling above a minimally acceptable threshold. On a tentative basis,

it was suggested that factor analysis techniques[88] may be of utility in re-designing scales in the questionnaire.

The prevalence of occupational stress was measured, generally across the sample and, then, specifically in relation to a number of demographic variables. It was found that the occupational stress level in the study sample as a whole was high (as compared to the reference value) and that there was a significant variance in terms of *job category*. Moreover, the managers group appeared to be particularly vulnerable. Occupational stress was also found to correlate positively with *burnout* and *sleeping troubles*, and negatively with *self-rated health*.

An analysis of risk factors was undertaken using logistic modelling. In the main multivariate model, variables that were identified as being significantly harmful were *offensive behaviour, emotional demands* and *quantitative demands*, while perceived *quality of leadership* was significantly protective. Analysis by *sex* showed that *work-family conflict* and *emotional demands* were risk factors for occupational stress in females, while *rewards (recognition)* and *social support from supervisors* were protective. In males, *offensive behaviour* was a risk while the *social community at work* afforded significant protection against *stress*.

Ordinal regression modelling considered the transition from *low stress* to *high stress*. It showed that *offensive behaviour* and *quantitative demands* were, again, significantly harmful while a *commitment to workplace* could, potentially, prevent this progression of *stress*. Finally, it was found that all of the significant variables could

be group into three main categories. These were: (1) job characteristics, (2) organisational relationships and (3) home-work interactions.

After exploring each of the significant risk factors in considerable detail, the contextual importance of resource constraints and HIV/AIDS was briefly discussed. Finally, the following study limitations were identified: a low response rate; the need for (or lack of) questionnaire adaption; the use of an interval approach to Likert scale interpretation, the choice of the statistic to measure reliability and the unavailability of local baseline data.

6.3. Generalizability of the study

Before presenting the recommendations, it is appropriate to consider the issue of the generalizability of the study findings. Generalizability hinges on the question of *external validity*, that is: can the study's findings on occupational stress be applied to other (target) populations?[46] Greenberg et al. have argued that to answer questions on external validity involves a judgement in which types of participants in the study, and differences between these and participants in other populations, are pertinent.[46]

In this study, administrative staff members were deliberately chosen as it was assumed that counterparts could be found in many other public institutions. It is plausible that the vast majority of these organisations have some form of management, employ a category of staff that deals with back office duties, and have another group of employees involved with customer interface at the front line.

Indeed, forms of this typology are mentioned in both peer-reviewed studies[61] and the grey literature.[137]

While is also reasonable to assume that, in some organisations, the same employees may fulfill more than one of these roles, and that, in many others, there are different categories (such as highly specialized professional staff), it was believed that the core groups identified allowed for at least some generalizability to other South African workforces.

6.4. Recommendations

Recommendations will be divided into: 1) instrument adaption, 2) intervention development, and 3) priorities for further research.

6.4.1. Instrument adaptation

While the validity and reliability of the COPSOQ has been tested within the international context,[48,49,51] there appears to be a need for further adaption of the tool so that it is better matched to examining the complex problem of occupational stress within the South African context. Each of scales of the COPSOQ should, ideally, be re-assessed, and possibly modified. Primary data collection may first be needed to identify issues that are relevant to local context (such as having to work in a resource-constrained setting). Focus groups may be of particular value here, not only in terms questionnaire content development, but also for involving members of (potential) study populations.[138]

Confirmatory factor analysis can then be undertaken to simplify and/or refine the scales.[89] A testing of both the reliability and the validity of the modified scales could follow. For reliability analysis, the test-retest design is recommended.[48] For validity testing, assessing both content validity (by asking mental health professionals to give their opinion on the modified scales) and construct validity (by comparing scales with those of other occupational stress instruments) may be of merit.[46] Finally, the modified COPSOQ should be translated into languages that participants would be most comfortable with, with each translated version undergoing reliability and validity re-assessment.[139]

6.4.2. Intervention design

Given the elevated levels of occupational stress detected amongst the administrative staff at CHBAH, the design and implementation of an occupational stress intervention programme is highly recommended. This could be undertaken in partnership with relevant organisations, such as the NIOH. The intervention process could also incorporate elements of the WHO 'step-wise' model,[32] the PRIMA-EF model[54] and the NIOSH prevention model, as outlined below.

6.4.2.a. Establishing a working committee

A suggested initial step in the intervention process is the establishment of a working committee comprised of managers and employees as this provides the platform for a participatory approach to occupational stress management.[30] Such a committee would, in this instance, include representatives from CHBAH's management and

affected employees as well as staff of the hospital's Employee Wellness Programme (EWP). All subsequent steps in the intervention process should be carried be out in conjunction with this committee.

6.4.2.a. Assessing risks

Assessing psychosocial risks in the workplace should be an essential part of the intervention model.[54] At the individual level, this could involve the administration of a modified COPSOQ as well as the use of complementary instruments, such as burnout-related questionnaires, to assess related conditions. Where *high stress* is detected, employees may undergo further clinical assessments, allowing for the screening/detection of both psychological sequelae (such as depression and anxiety) and physiological sequelae (such as hypertension and diabetes).

At the organisational level, data from individual assessments could be collated (and complemented with data from group discussions[30]). The analysis of these data could form the basis of a risk assessment focused on identifying psychosocial hazards and their associated outcomes.[54]

6.4.2.b. Developing and implementing interventions

- *Primary prevention:* primary prevention of occupational stress involves modifying the manner in which work is organised.[54] With regards to the administrative staff at CHBAH, such interventions should start by focusing on:

- preventing *offensive behaviour* (example: developing and implementing anti-bullying policies[140]).
- Preventing *work-family conflict* (example: negotiating around flexible working schedules[129])
- reducing emotional demands (example: ensuring that there are adequate job resources available[101]).
- mitigating *quantitative demands* (example: improving the level of job control that employees' have[103])
- enhancing the *quality of leadership* (example: providing education with regards to the transformational style of leadership[120]).
- providing *rewards/recognition* (example: ensuring that there are opportunities for recognition and, where appropriate, promotion[111]).
- strengthening the *social support of supervisors* (example: providing training with regards to supervisory coaching[101]).
- improving the *social community at work* (example: facilitating 'integrative' conflict resolution within the workplace[127]).

Given the high level of occupational stress amongst managers, it is recommended that they be prioritized. Interventions that may be of particular relevance to this group are ones that: reduce *role conflicts*, improve *opportunities for development* and enhance the experience of the *community at work*.[93,95]

- *Secondary prevention:* secondary prevention shifts the focus to the individual development of skills that reduce occupational stress.[54] Ensuring that

employees have adequate coping resources[97] would, therefore, be important here. Further reduction of *offensive behaviour* and *quantitative demands* are particularly important as these are risk factors that can escalate the condition of those who already have (a low level of) *stress*. Furthermore, the improvement of *commitment to workplace* (through, for example, appropriate EI training[108]) would be of benefit here.

- *Tertiary prevention:* This level of prevention involves occupational stress rehabilitation interventions.[54] Data from psychological/clinical assessments of employees with *high stress* can be analysed to identify risks related to stress and its sequelae. These data can then be used to develop appropriate interventions.

6.4.2.c. Evaluating intervention outcomes

The evaluation of the occupational stress programme should seek to determine if the intervention goals were reached, what the employees perceptions of the occupational stress interventions were and if there were any unexpected outcomes.[30,32] It has been recommended that such evaluations be conducted in two-parts: one within the first few months after implementation and the other after at least one year.[32] Evaluation findings should be used to refine the occupational stress programme at CHBAH, thereby forming a cycle of improvement.[30]

6.4.3. Priorities for further research

6.4.3.a. Occupational stress and HIV/AIDS:

Perceived stress in relation to HIV/AIDS care has been described in the South African setting.[133] Further investigation into to the impact of the HIV/AIDS burden on the target population (through, for example, adding a scale related to HIV/AIDS and stressors in the questionnaire) is recommended.

6.4.3.b. Economic evaluation of occupational stress

Given the substantial economic cost of occupational stress[25] and the resource constraints in public sector hospitals,[131] an economic evaluation may be of value. This could be in the form of a cost-effectiveness analysis,[141] whereby the costs and effect (in terms a MID reduction) between the occupational stress programme and current EWP practice can be compared.

6.4.3.c. Occupational stress research in other groups/settings

While the rationale for focus on the administrative component of the staff establishment has been explained, future research could begin to incorporate other groups, such as health professionals. Furthermore, the study methodology could be further developed so that it can be used in other institutional settings. This would allow for comparative analyses and the detection of broader trends with regards to occupational stress. It would also be important to ensure that study groups are large

enough in size and appropriately stratified (the latter would, for example, allow for better assessment of potential effect modifiers[75]).

6.4.3.d. Development of occupational stress guidelines

Research from the comparative analyses, together with data from other studies, could help to form an evidence-base for the development of occupational stress guidelines. Such guidelines could relate to both suggested research approaches and occupational stress management practices. Guidelines could be developed by an inter-disciplinary team of researchers, mental health professionals, occupational physicians and public health specialists.

6.5. Concluding thoughts

This study has sought to provide a better understanding of occupational stress in a South African workforce. After raising certain considerations with regards to instrument testing, it has described the distribution of occupational stress within the workforce and has suggested a focus on reducing certain risks and enhancing specific protective factors. It is hoped that the study will be of at least some value in preventing the occurrence of stress-related illnesses amongst (and, ultimately, improving the work experience of) fellow employees.

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APPENDICES

Appendix 1: The Copenhagen Psychosocial Questionnaire (medium size)

Appendix 2: The scales of the medium size COPSOQ II questionnaire

Appendix 3: Ethics clearance certificate

Appendix 4: Medical Advisory Committee permission letter

Appendix 5: Consent form

Appendix 6: Study information sheet

Appendix 1:

The Copenhagen Psychosocial Questionnaire

(medium size)

Questionnaire on psychosocial factors at work

This space is for company logo or name



Which department do you work in? _____

What is your job? _____

Are you:	☐ Woman	☐ Man
How old are you?	☐ Under 30 years ☐ 30-39 years ☐ 40-49 years ☐ 50-59 years ☐ 60 years or more	

Psychosocial factors at work

The following questions are about your psychosocial work environment and job satisfaction. Some of the questions may fit better to your work than others, but please answer all questions.

	Always	Often	Some-times	Seldom	Never/ hardly ever
Is your work unevenly distributed so it piles up?	☐	☐	☐	☐	☐
Does your work put you in emotionally disturbing situations?	☐	☐	☐	☐	☐
Do you have a large degree of influence concerning your work?	☐	☐	☐	☐	☐
Do you have to work very fast?	☐	☐	☐	☐	☐
Is there a good atmosphere between you and your colleagues?	☐	☐	☐	☐	☐

	Always	Often	Some-times	Seldom	Never/ hardly ever
Do you have to relate to other people's personal problems as part of your work?	☐	☐	☐	☐	☐
Do you have a say in choosing who you work with?	☐	☐	☐	☐	☐
Do you have any influence on what you do at work?	☐	☐	☐	☐	☐
Do you get behind with your work?	☐	☐	☐	☐	☐
Is there good co-operation between the colleagues at work?	☐	☐	☐	☐	☐
How often do you not have time to complete all your work tasks?	☐	☐	☐	☐	☐
Do you have enough time for your work tasks?	☐	☐	☐	☐	☐
Do you feel part of a community at your place of work?	☐	☐	☐	☐	☐
Can you influence the amount of work assigned to you?	☐	☐	☐	☐	☐
How often do you consider looking for work elsewhere?	☐	☐	☐	☐	☐
How often do you get help and support from your colleagues?	☐	☐	☐	☐	☐
How often are your colleagues willing to listen to your problems at work?	☐	☐	☐	☐	☐
How often do your colleagues talk with you about how well you carry out your work?	☐	☐	☐	☐	☐

	To a very large extent	To a large extent	Some-what	To a small extent	To a very small extent
Is it necessary to keep working at a high pace?	☐	☐	☐	☐	☐
Is your work emotionally demanding?	☐	☐	☐	☐	☐
Does your work require you to take the initiative?	☐	☐	☐	☐	☐
Is your work meaningful?	☐	☐	☐	☐	☐
At your place of work, are you informed well in advance concerning for example important decisions, changes, or plans for the future?	☐	☐	☐	☐	☐
Does your work have clear objectives?	☐	☐	☐	☐	☐
Are contradictory demands placed on you at work?	☐	☐	☐	☐	☐
Is your work recognised and appreciated by the management?	☐	☐	☐	☐	☐
Do you feel that the work you do is important?	☐	☐	☐	☐	☐
Would you recommend a good friend to apply for a position at your workplace?	☐	☐	☐	☐	☐
Do you know exactly which areas are your responsibility?	☐	☐	☐	☐	☐
Does the management at your workplace respect you?	☐	☐	☐	☐	☐
Do you get emotionally involved in your work?	☐	☐	☐	☐	☐
Can you use your skills or expertise in your work?	☐	☐	☐	☐	☐
Do you enjoy telling others about your place of work?	☐	☐	☐	☐	☐
Do you receive all the information you need in order to do your work well?	☐	☐	☐	☐	☐

	To a very large extent	To a large extent	Some-what	To a small extent	To a very small extent
Do you do things at work, which are accepted by some people but not by others?	☐	☐	☐	☐	☐
Are you treated fairly at your workplace?	☐	☐	☐	☐	☐
Do you know exactly what is expected of you at work?	☐	☐	☐	☐	☐
Do you sometimes have to do things, which ought to have been done in a different way? *(*	☐	☐	☐	☐	☐
Do you have the possibility of learning new things through your work?	☐	☐	☐	☐	☐
Do you feel motivated and involved in your work?	☐	☐	☐	☐	☐
Do you sometimes have to do things, which seem to be unnecessary?	☐	☐	☐	☐	☐
Do you work at a high pace throughout the day?	☐	☐	☐	☐	☐
Does your work give you the opportunity to develop your skills?	☐	☐	☐	☐	☐
Do you feel that your place of work is of great importance to you?	☐	☐	☐	☐	☐

Regarding your work in general.

How pleased are you with:

	Very satisfied	Satisfied	Un-satisfied	Very unsatisfied
- your work prospects?	☐	☐	☐	☐
- the physical working conditions?	☐	☐	☐	☐
- the way your abilities are used?	☐	☐	☐	☐
- your job as a whole, everything taken into consideration?	☐	☐	☐	☐

The workplace as a whole

The next questions are not about your own job but about the workplace as a whole.

	To a very large extent	To a large extent	Some-what	To a small extent	To e very small extent
Does the management trust the employees to do their work well?	☐	☐	☐	☐	☐
Can you trust the information that comes from the management?	☐	☐	☐	☐	☐
Are conflicts resolved in a fair way?	☐	☐	☐	☐	☐
Does the management withhold important information from the employees?	☐	☐	☐	☐	☐
Are employees appreciated when they have done a good job?	☐	☐	☐	☐	☐
Do the employees withhold information from each other?	☐	☐	☐	☐	☐
Do the employees withhold information from the management?	☐	☐	☐	☐	☐
Do the employees in general trust each other?	☐	☐	☐	☐	☐
Are all suggestions from employees treated seriously by the management?	☐	☐	☐	☐	☐
Are the employees able to express their views and feelings?	☐	☐	☐	☐	☐
Is the work distributed fairly?	☐	☐	☐	☐	☐

The next questions concern your relationship to your nearest superior.

	Always	Often	Some-times	Seldom	Never/ hardly ever
How often is your nearest superior willing to listen to your problems at work?	☐	☐	☐	☐	☐
How often do you get help and support from your nearest superior?	☐	☐	☐	☐	☐
How often does your nearest superior talk with you about how well you carry out your work?	☐	☐	☐	☐	☐

To what extent would you say that your immediate superior…

	To a very large extent	To a large extent	Some-what	To a small extent	To a very small extent
- makes sure that the individual member of staff has good development opportunities?	☐	☐	☐	☐	☐
- gives high priority to job satisfaction?	☐	☐	☐	☐	☐
- is good at work planning?	☐	☐	☐	☐	☐
- is good at solving conflicts?	☐	☐	☐	☐	☐

Work and private life

The next questions are about the connection between work and private life.

	Yes, often	Yes, some-times	Rarely	No, never
Do you often feel a conflict between your work and your private life, making you want to be in both places at the same time?	☐	☐	☐	☐

	Yes, certainly	Yes, to a certain degree	Yes, but only very little	No, not at all
Do you feel that your work drains so much of your energy that it has a negative effect on your private life?	☐	☐	☐	☐
Do you feel that your work takes so much of your time that it has a negative effect on your private life?	☐	☐	☐	☐
Do your friends or family tell you that you work too much?	☐	☐	☐	☐

If you have more comments on your psychosocial work environment, please write here:

Health and well-being

These questions are about how you have been during <u>the last 4 weeks.</u>

	All the time	A large part of the time	Part of the time	A small part of the time	Not at all
How often have you slept badly and restlessly?	☐	☐	☐	☐	☐
How often have you felt worn out?	☐	☐	☐	☐	☐
How often have you found it hard to go to sleep?	☐	☐	☐	☐	☐
How often have you been physically exhausted?	☐	☐	☐	☐	☐
How often have you been emotionally exhausted?	☐	☐	☐	☐	☐
How often have you woken up too early and not been able to get back to sleep?	☐	☐	☐	☐	☐
How often have you felt tired?	☐	☐	☐	☐	☐
How often have you woken up several times and found it difficult to get back to sleep?	☐	☐	☐	☐	☐
How often have you had problems relaxing?	☐	☐	☐	☐	☐
How often have you been irritable?	☐	☐	☐	☐	☐
How often have you been tense?	☐	☐	☐	☐	☐
How often have you been stressed?	☐	☐	☐	☐	☐

	Excellent	Very good	Good	Fair	Poor
In general, would you say your health is:	☐	☐	☐	☐	☐

Conflicts and offensive behaviours

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to undesired sexual attention at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Colleagues	Manager/ superior	Sub-ordinates	Clients/ customers/ patients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to threats of violence at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Colleagues	Manager/ superior	Sub-ordinates	Clients/ customers/ patients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to physical violence at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Colleagues	Manager/ superior	Sub-ordinates	Clients/ customers/ patients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

Bullying means that a person repeatedly is exposed to unpleasant or degrading treatment, and that the person finds it difficult to defend himself or herself against it.

	Yes, daily	Yes, weekly	Yes, monthly	Yes, a few times	No
Have you been exposed to bullying at your workplace during the last 12 months?	☐	☐	☐	☐	☐

	Collea-gues	Manager/ superior	Sub-ordinates	Clients/ customers/ patients
If yes, from whom? (You may tick off more than one)	☐	☐	☐	☐

There are no further questions.

Thank you for filling out the questionnaire.

Appendix 2:

The scales of the medium size COPSOQ II questionnaire

27.8.2007

COPSOQ II

The scales of the MEDIUM SIZE COPSOQ II questionnaire.

The purpose of this paper is to describe the scales and items of the medium size questionnaire of the COPSOQ II. The questionnaire was developed on the basis of a survey of a representative sample of adult Danes aged 20-59 years. A total of 4,732 persons responded of whom 3,517 were employees. The response rate was 60.4% and 52% of the respondents were women. The population of 3,517 employees comprise the study base for the analyses described in the following.

As a rule we have been aiming for scales with 3-4 questions (items) per scale. It is our experience that this gives sufficient reliability and precision.

New items and scales, which were not part of COPSOQ I, are in ***italics*.** The numbers correspond to consecutive numbers in the original test-questionnaire.

Most of the questions in COPSOQ II have *five response options*. These are:
1. Always, Often, Sometimes, Seldom, Never/hardly ever. (Called *(Always …)* in this paper).
2. To a very large extent, To a large extent, Somewhat, To a small extent, To a very small extent. (Called *(To a very large …)* in this paper).

Scoring of the scales

All the scales of COPSOQ are scored 0-100 points. (The exception is the short questionnaire in which a very simple scoring system is used). The five response options are scored 100, 75, 50, 25, 0. In case of only four response options the scores are 100, 66.7, 33.3, 0. The total score on a scale for a respondent is the average of the scores on the individual items. A person is considered missing if less than half of the questions in a scale have been answered.

High scores correspond to high values on the respective dimensions. Thus, a high score on burnout means a high burnout level, and a low score on influence means a low level of influence at work. In most cases high levels are “good” or “healthy”. The exceptions are quantitative demands, work pace, emotional demands, role conflicts, work-family conflict, burnout, stress, and sleeping problems.

A few of the questions are scored with “reversed scoring”. This is indicated in the text below at all the relevant places.

Quantitative demands:

32.1 Is your workload unevenly distributed so it piles up? *(Always…)*
32.20 How often do you not have time to complete all your work tasks? *(Always…)*
32.14 Do you get behind with your work? *(Always…)*
32.23 Do you have enough time for your work tasks? *(Always…).* (Reversed scoring)

Scale characteristics: Non-response: 77. Average 40.2. SD: 20.5. Cronbach's alpha = 0.82. Item-correlations with total scale: 0.58 – 0.73. Inter-item correlations: 0.45 – 0.65.

Tempo, Work pace:

32.6 Do you have to work very fast? *(Always…)*
35.35 Do you work at a high pace throughout the day? (To a very large…)
35.2 Is it necessary to keep working at a high pace? (To a very large…)

Scale characteristics: Nonresponders: 79. Average: 59.5. SD: 19.1. Cronbach's alpha: 0.84. Item correlations with total scale: 0.67 – 0.74. Inter-item correlations: 0.58 – 0.67.

Cognitive demands:

There is no scale on cognitive demands in the medium size questionnaire.

Emotional demands:

32.3 Does your work put you in emotionally disturbing situations? *(Always…)*
32.8 Do you have to relate to other people's personal problems as part of your work? (Always…)
35.3 Is your work emotionally demanding? *(To a very large…)*
35.19 Do you get emotionally involved in your work? *(To a very large…)*

Scale characteristics: Non responders: 76. Average: 40.7. SD: 24.3. Cronbach's alpha: 0.87. Item-correlations with the total scale: 0.65 – 0.80. Inter-item correlations: 0.54 – 0.70.

Demands for hiding emotions:

There is no scale on demands for hiding emotions in the medium size questionnaire.

Sensory demands.

There is no scale for sensory demands in COPSOQ II.

Influence at work:

32.4 Do you have a large degree of influence concerning your work? *(Always…)*

32.9 Do you have a say in choosing who you work with? *(Always…)*
32.24 Can you influence the amount of work assigned to you? *(Always…)*
32.13 Do you have any influence on what you do at work? *(Always…)*

Scale characteristics: Non responders: 78. Average: 49.8. SD: 21.2. Cronbach's alpha: 0.73. Item correlations with total scale: 0.43 – 0.59. Inter-item correlations: 0.31 – 0.49.

Possibilities for development (Skill discretion):

35.4 Does your work require you to take the initiative? *(To a very large…)*
35.31 Do you have the possibility of learning new things through your work? *(To a very large…)*
35.20 Can you use your skills or expertise in your work? *(To a very large…)*
35.36 Does your work give you the opportunity to develop your skills? *(To a very large…)*

Scale characteristics: Non responders: 91. Average: 65.9. SD: 17.6. Cronbach's alpha: 0.77. Item correlations with the total scale: 0.47 – 0.70. Inter-item correlations: 0.34 – 0.70.

Variation of work:

There is no scale on variation of work in the medium size questionnaire.

Degrees of freedom at work:

There is no scale on degrees of freedom at work in COPSOQ II.

Meaning of work:

35.5 Is your work meaningful? *(To a very large…)*
35.13 Do you feel that the work you do is important? *(To a very large…)*
35.32 Do you feel motivated and involved in your work? *(To a very large…)*

Scale characteristics: Non responders: 97. Average: 73.8. SD: 15.8. Cronbach's alpha: 0.74. Item correlations with total scale: 0.55 – 0.57. Inter item correlations: 0.48 – 0.49.

Commitment to the workplace:

35.21 Do you enjoy telling others about your place of work? *(To a very large…)*
35.37 Do you feel that your place of work is of great importance to you? *(To a very large…)*
35.14 Would you recommend a good friend to apply for a position at your workplace? (To a very large…)
32.28 How often do you consider looking for work elsewhere? (Always…) (Reversed scoring).

Scale characteristics: Non responders: 78. Average: 60.9. SD: 20.4. Cronbach's alpha: 0.77. Item correlations with the total scale: 0.55 – 0.61. Inter item correlationers: 0.38 – 0.51.

Predictability:

35.6 At your place of work, are you informed well in advance concerning for example important decisions, changes, or plans for the future? *(To a very large…)*
35.22 Do you receive all the information you need in order to do your work well? *(To a very large…)*

Scale characteristics: Non responders: 80. Average: 57.7. SD: 20.9. Cronbach's alpha: 0.74.

Rewards:

35.10 Is your work recognised and appreciated by the management? (To a very large…)
35.17 Does the management at your workplace respect you? (To a very large…)
35.25 Are you treated fairly at your workplace? (To a very large…)

Scale characteristics: Non responders: 98. Average: 66.2. SD: 19.9. Cronbach's alpha: 0.83. Item correlations with the total scale: 0.63 – 0.75. Inter item correlations: 0.54 – 0.70.

Role clarity:

35.7 Does your work have clear objectives? *(To a very large…)*
35.15 Do you know exactly which areas are your responsibility? *(To a very large…)*
35.28 Do you know exactly what is expected of you at work? *(To a very large…)*

Scale characteristics: Non responders: 96. Average: 73.5. SD: 16.4. Cronbach's alpha: 0.78. Item correlations with total scale: 0.55 – 0.67. Inter item correlations: 0.48 – 0.65.

Role conflicts:

35.23 Do you do things at work, which are accepted by some people but not by others? *(To a very large…)*
35.8 Are contradictory demands placed on you at work? *(To a very large…)*
35.29 Do you sometimes have to do things, which ought to have been done in a different way? *(To a very large…)*
35.33 Do you sometimes have to do things, which seem to be unnecessary? *(To a very large…)*

Scale characteristics: Non responders: 93. Average: 42.0. SD: 16.6. Cronbach's alpha: 0.67. Item correlations with total scale: 0.43 – 0.49. Inter item correlations: 0.30 – 0.41.

Quality of leadership:

48. To what extent would you say that your immediate superior…

2. makes sure that the individual member of staff has good development opportunities? *(To a very large…)*
4. gives high priority to job satisfaction? *(To a very large…)*
5. is good at work planning? *(To a very large…)*
7. is good at solving conflicts? *(To a very large…)*

Scale characteristics: Non responders: 852. Average: 55.3. SD: 21.1. Cronbach's alpha: 0.89. Item correlations with total scale: 0.73 – 0.79. Inter item correlations: 0.60 – 0.71.

Social support:

Scale for *social support from colleagues:*
33.1 How often do you get help and support from your colleagues? *(Always …).*
33.2 How often are your colleagues willing to listen to your problems at work? *(Always …).*
33.3 How often do your colleagues talk with you about how well you carry out your work? *(Always …).*

(For these items an extra response option: "Not relevant" has been added for those employees who might work alone without contact to colleagues. These respondents were scored as missing on this scale).

Scale characteristics: Non responders: 187. Average: 57.3. SD: 19.7. Cronbach's alpha: 0.70. Item correlations with the total scale: 0.48 – 0.56. Inter item correlations: 0.39 – 0.49.

Scale for *social support from supervisors:*
47.1 How often is your nearest superior willing to listen to your problems at work? *(Always …).*
47.2 How often do you get help and support from your nearest superior? *(Always …).*
47.3 How often does your nearest superior talk with you about how well you carry out your work? *(Always …).*

(These questions were only addressed to respondents who were not supervisors themselves and who had a supervisor).

Scale characteristics: Non responders: 852. Average: 61.6. SD: 22.4. Cronbach's alpha: 0.79. Item correlations with total scale: 0.59 – 0.68. Inter item correlations: 0.49 – 0.61.

Correlation between the two scales on social support from colleagues and supervisors, respectively, is 0.46 (rather low).

Feedback:

There is no scale on feedback in COPSOQ II.

Social relations:

There is no scale for social relations in COPSOQ II.

Social community at work:

33.4 Is there a good atmosphere between you and your colleagues? *(Always…)*
33.5 Is there good co-operation between the colleagues at work? *(Always…)*
33.6 Do you feel part of a community at your place of work? *(Always…)*

Scale characteristics: Non responders: 127. Average: 78.7. SD: 18.9. Cronbach's alpha: 0.86. Item correlations with total scale: 0.71 – 0.74. Inter item correlations: 0.65 – 0.68.

Job insecurity:

There is no scale on job insecurity in the medium size questionnaire.

Satisfaction with work – job satisfaction:

34. Regarding your work in general. How pleased are you with -

1. your work prospects? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*
2. the physical working conditions? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*
4. the way your abilities are used? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*
6. your job as a whole, everything taken into consideration? *(Very satisfied. Satisfied. Unsatisfied. Very unsatisfied. Not relevant)*

Scale characteristics: Non responders: 122. Average: 65.3. SD: 18.2. Cronbach's alpha: 0.82. Item correlations with total scale: 0.57 – 0.71. Inter item correlations: 0.46 – 0.62.

Work family conflict:

29. Do you often feel a conflict between your work and your private life, making you want to be in both places at the same time? (Yes, often. Yes, sometimes. Rarely. No, never).
30.1 Do you feel that your work drains so much of your <u>energy</u> that it has a negative effect on your private life? (Yes, certainly. Yes, to a certain degree. Yes, but only very little. No, not at all).
30.2 Do you feel that your work takes so much of your <u>time</u> that it has a negative effect on your private life? (Yes, certainly. Yes, to a certain degree. Yes, but only very little. No, not at all).
30.3 Do your friends or family tell you that you work too much? (Yes, certainly. Yes, to a certain degree. Yes, but only very little. No, not at all).

Scale characteristics: Non responders: 101. Average: 33.5. SD: 24.3. Cronbach's alpha: 0.80. Item correlations with total scale: 0.52 – 0.74. Inter item correlations: 0.39 – 0.69.

Family work conflict

There is no scale on family-work conflict in the medium size questionnaire.

Trust:

Top of the page: *The next questions are not about your own job but about the workplace as a whole.*

Scale for *"horizontal trust":*
36.10 Do the employees withhold information from each other? (To a very large…) (Reversed scoring)
36.11 Do the employees withhold information from the management? (To a very large…) (Reversed scoring)
36.15 Do the employees in general trust each other? (To a very large…)

Scale characteristics: Non-responders: 113. Average: 68.6. SD: 16.9. Cronbach's alpha: 0.77. Item correlations with total scale: 0.48 – 0.69. Inter item correlations: 0.41 – 0.68.

Scale for *"vertical trust":*
36.1 Does the management trust the employees to do their work well? (To a very large…)
36.4 Can you trust the information that comes from the management? (To a very large…)
36.7 Does the management withhold important information from the employees? (To a very large...) (Reversed scoring).
36.19 Are the employees able to express their views and feelings? (To a very large…)

Scale characteristics: Non responders: 87. Average: 67.0. SD: 17.7. Cronbach's alpha = 0.80. Item correlations with the total scale: 0.55 – 0.69. Inter item correlations: 0.40 – 0.56.

The two scales for trust have a correlation of 0.57, which confirms that they do not measure the same thing.

Justice and respect:

These items were under the same heading on the top of the page as the items on trust.

36.5 Are conflicts resolved in a fair way? (To a very large…)
36.8 Are employees appreciated when they have done a good job? (To a very large…)
36.18 Are all suggestions from employees treated seriously by the management? (To a very large...)
36.25 Is the work distributed fairly? (To a very large…)

Scale characteristics: Non responders: 93. Average: 59.2. SD: 17.7. Cronbach's alpha = 0.83. Item correlations with total scale: 0.61 – 0.72. Inter item correlations: 0.48 – 0.66.

Inclusiveness, the social responsibility:

There is no scale on social inclusiveness in the medium size questionnaire.

Self rated health:

8. In general, would you say your health is: *(Excellent, Very good, Good, Fair, Poor)*

Characteristics: Non responders: 41. Average: 66.0. SD: 20.9.

Sleeping troubles:

Top of page: These questions are about how you have been during the last 4 weeks.

10.1 How often have you slept badly and restlessly? (All the time; A large part of the time; Part of the time; A small part of the time; Not at all)
10.3 How often have you found it hard to go to sleep? (All the time…)
10.8 How often have you woken up too early and not been able to get back to sleep? (All the time…)
10.10 How often have you woken up several times and found it difficult to get back to sleep? (All the time…)

Scale characteristics: Non responders: 21. Average: 21.3. SD: 19.0. Cronbach's alpha: 0.86. Item correlations with total scale: 0.62 – 0.79. Inter item correlations 0.48 – 0.74.

Burnout:

Top of page: These questions are about how you have been during the last 4 weeks.

10.2 How often have you felt worn out? (All the time…)
10.4 How often have you been physically exhausted? (All the time…)
10.7 How often have you been emotionally exhausted? (All the time…)
10.9 How often have you felt tired? (All the time…)

Scale characteristics: Non responders: 22. Average: 34.1. SD: 18.2. Cronbach's alpha: 0.83. Item correlations with total scale: 0.58 – 0.75. Inter item correlations: 0.38 – 0.69.

Stress:

Top of page: These questions are about how you have been during the last 4 weeks.

10.14 How often have you had problems relaxing? (All the time…)
10.16 How often have you been irritable? (All the time…)
10.24 How often have you been tense? (All the time…)
10.30 How often have you been stressed? (All the time…)

Scale characteristics: Non responders: 22. Average: 26.7. SD: 17.7. Cronbach's alpha: 0.81. Item correlations with total scale: 0.57 – 0.68. Inter item correlations: 0.45 – 0.58.

Depressive symptoms:

There is no scale for depressive symptoms in the medium size questionnaire.

Somatic stress:

There is no scale for somatic stress in the medium size questionnaire.

Cognitive stress:

There is no scale for cognitive stress in the medium size questionnaire.

Self-efficacy:

There is no scale on self-efficacy in the medium size questionnaire.

Offensive behaviour:

The medium size questionnaire also includes questions on *sexual harassment, threats of violence, physical violence, and bullying.*

The full response distributions of the four items may be found in the model questionnaire.

The 12 months' prevalence of these forms of offensive behaviours among Danish employees (2005) are as follows:

Sexual harassment:	2.9%
Threats of violence	7.8%
Physical violence	3.9%
Bullying	8.3%

Overview of scales and number of questions in the three COPSOQ II questionnaires

	Questionnaire		
	Long	Medium	Short
Quantitative demands	4	4	2
Work pace	3	3	2
Cognitive demands	4	-	-
Emotional demands	4	4	2
Demands for hiding emotions	3	-	-
Influence	4	4	2
Possibilities for development	4	4	2
Variation	2	-	-
Meaning of work	3	3	2
Commitment to the workplace	4	4	2
Predictability	2	2	2
Rewards (recognition)	3	3	2
Role clarity	3	3	2
Role conflicts	4	4	-
Quality of leadership	4	4	2
Social support from supervisor	3	3	2
Social support from colleagues	3	3	-
Social community at work	3	3	-
Job insecurity	4	-	-
Job satisfaction	4	4	1
Work-family conflict	4	4	2
Family-work conflict	3	-	-
Trust regarding management	4	4	2
Mutual trust between employees	3	3	-
Justice and respect	4	4	2
Social inclusiveness	4	-	-
Self rated health	1	1	1
Burnout	4	4	2
Stress	4	4	2
Sleeping troubles	4	4	-
Depressive symptoms	4	-	-
Somatic stress symptoms	4	-	-
Cognitive stress symptoms	4	-	-
Self-efficacy	6	-	-
Sexual harassment	1	1	1
Threats of violence	1	1	1
Physical violence	1	1	1

Bullying	1	1	1
Unpleasant teasing	1	-	-
Conflicts and quarrels	1	-	-
Gossip and slander	1	-	-
Number of dimensions	41	28	23
Number of questions	128	87	40

Appendix 3:

Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Heinrich C Volmink

CLEARANCE CERTIFICATE	**M120920**
PROJECT	Occupational Stress in a South African Work-force: Instrument Testing, Prevalence Measurements and Risk Factor Analysis"
INVESTIGATORS	Dr Heinrich C Volmink.
DEPARTMENT	School of Public Health
DATE CONSIDERED	28/09/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 16/01/2013 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Prof David Reese

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix 4:

Medical Advisory Committee permission letter

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

MEDICAL ADVISORY COMMITTEE

CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

PERMISSION TO CONDUCT RESEARCH

Date: 23rd January 2013

TITLE OF PROJECT: Occupational Stress Study in a South African Workforce:Instrument Testing, Prevalence Measurement and Risk Factor Analysis

UNIVERSITY: Witwatersrand

Principal Investigator: Dr Heinrich C Volmink

Department: School of Public Health

Supervisor : Dr D Rees

Permission Head Department (where research conducted): **Yes**

Date of start of proposed study: February 2013
Date of completion of data collection: April 2013

The Medical Advisory Committee recommends that the said research be conducted at Chris Hani Baragwanath Academic Hospital. The CEO / management of Chris Hani Baragwanath Academic Hospital is accordingly informed and the study is subject to:-

- Permission having been granted by the Committee for Research on Human Subjects of the University of the Witwatersrand.
- The Hospital will not incur extra costs as a result of the research being conducted on its patients within the hospital
- The MAC will be informed of any serious adverse events as soon as they occur
- Permission is granted for the duration of the Ethics Committee Approval.

.....
Recommended
(On behalf of the MAC)
Date: 23/01/2013

.....
Approved/Not Approved
Hospital Management
Date: 25/01/13

Appendix 5:

Consent form

CONSENT FORM

CONSENT FOR THE USE OF COMPLETED QUESTIONNAIRE DATA

Proposed Study Title: Occupational Stress in a South African Workforce

DATE: ___ / ___ / 2012 **Study Number:** | | | | | |

We are currently undertaking a research study on workplace stress (this is being done with through the National Institute for Occupational Health and the University of the Witwatersrand). If you would like to participate in this study, we would ask you to please complete the provided Copenhagen Psychosocial Questionnaire. Data from completed questionnaires will be used for research purposes. Approval for this study has been granted by the **Human Research Ethics Committee (Medical)** of the University of the Witwatersrand.

Please note that your personal information will kept securely and will remain confidential. .

If you choose not to consent, you will not be disadvantaged in any way.

Furthermore, if at any time you choose to withdraw your consent, you also will not be disadvantaged.

- **I have been provided with and have read the *Study Information Sheet* related to this research.**
- **I consent to my completed questionnaires being used for research purposes.**

Signature of Participant:	Date:

Researcher name:

Research signature:

Date:

Contact information

- **Principal Investigator**, Dr Heinrich Volmink:
  Telephone: 0824586867 *Email:* heinrich.volmink@wits.ac.za
- **Human Research Ethics Committee (Medical)** of the University of the Witwatersrand:
  Telephone: 011-717-1234 *Email:* anisa.keshav@wits.ac.za

Appendix 6:

Study information sheet

STUDY INFORMATION SHEET

Proposed Study Title: Occupational Stress in a South African Workforce

Introduction

Hello, my name is Heinrich Volmink and I am part of team conducting research into occupational stress. This type of stress is a substantial health challenge in many workplaces in South Africa. The research is being carried out through the National Institute for Occupational Health (NIOH) and the University of the Witwatersrand (Wits). One of the reasons why we are conducting this research is so that we can establish risk factors for occupational stress in a hospital setting. We hope to recruit at least 250 participants from Chris Hani Baragwanath Academic Hospital.

What will the study involve?

The study will involve you completing a questionnaire called the *Copenhagen Psychosocial Questionnaire* which will include questions relating to occupational stress. This questionnaire should take about 30 minutes of your time to complete. You will be asked to complete the questionnaire at a specific time and venue convenient to you. One of the members of the research team will be available during this time, to answer any questions that you may have, and to collect your questionnaires once completed. All of the data obtained from completed questionnaires will be analyzed through a scientific research process.

Please note that you will be asked to complete this questionnaire again after approximately one month. This is because we are also assessing the questionnaire itself, and therefore need two completed questionnaires per person.

Why have I been chosen to participate?

You have been randomly selected from a list of personnel provided by Chris Hani Baragwanath Academic Hospital - your selection <u>was not</u> based on any prior knowledge of your health.

What will be done the ensure confidentiality?

Please rest assured that your identity will be protected. You will be assigned a unique study number and the link between this number and your name will be kept securely by myself. All you will be asked for is your signature on a consent form. In this way you will remain anonymous. Data that may be used in reports will not include any information that identifies you as a participant in this study. Only collective results will be published.

What if the questionnaire shows that I have a high level of occupational stress?

If significant health risks are detected by this study we will contact you directly and may advise you to seek further support from the Employee Wellness Programme staff (contact person: Gayle Schmidt, 011 933 8913 or # 7105) or a suitable health care provider of your choice.

Will the study put anyone at risk?

The questionnaire may detect high levels of stress or burnout, and may make you more aware of the underlying causes of this. In instances where this occurs we may advise you to consult an appropriate health care provider of your choice.

What will the benefits of the study be?

While you may not experience any direct benefits, it is hoped that the study will contribute to knowledge that may help the research team and the hospital to gain a better understanding of occupational stress and how to address it. This will involve making recommendations for the delivery of appropriate health services.

What if I don't want to participate in the study?

Your participation in this study is entirely voluntary and you may choose stop at any time without any consequences.

Who can I contact if I have any questions?

If you have any questions regarding the study, please contact Dr HC Volmink on 0824586867 or Heinrich.Volmink@wits.ac.za. If there are any further concerns relating to the research process, please contact the Health Research Ethics Committee at Wits on 011 7171234.